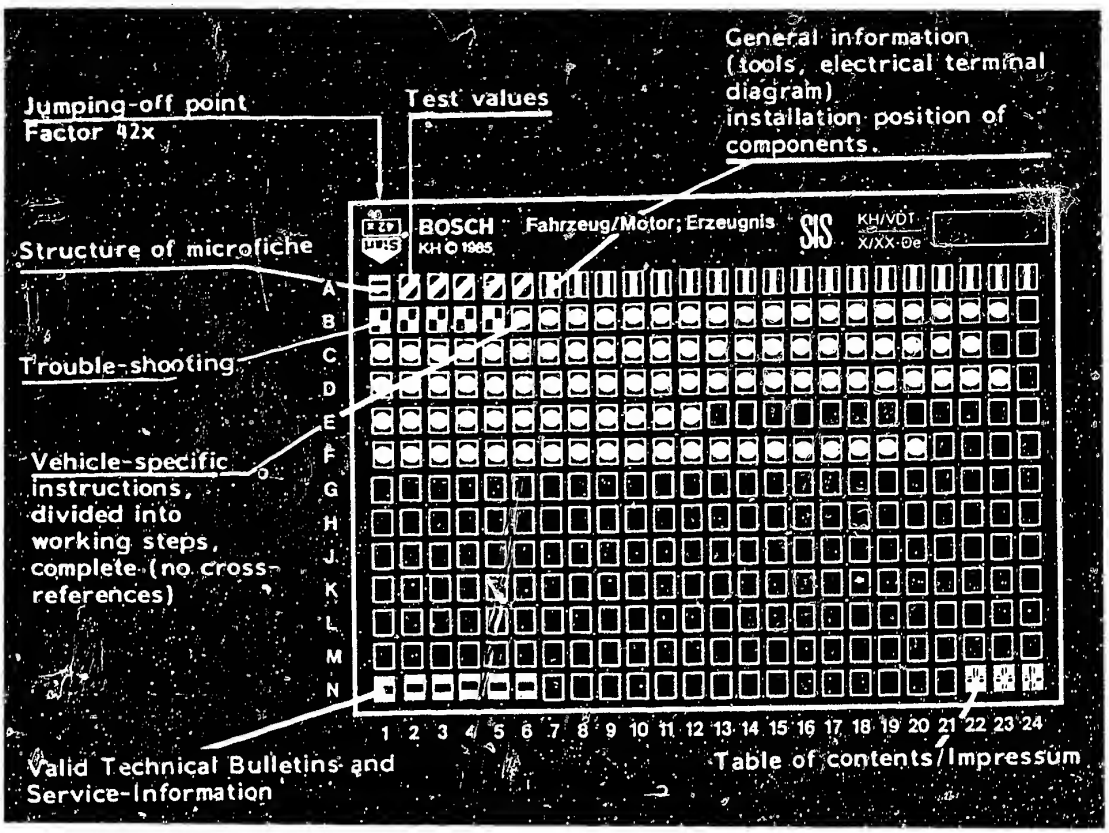
Microfiche layout



1. Read from left to right

2. Title of microfiche (appears on each coordinate)

E 16	Product/assembly/test step Vehicle/engine	

Coordinate

3. Limits of section

Beginning	Mid-section	End	One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

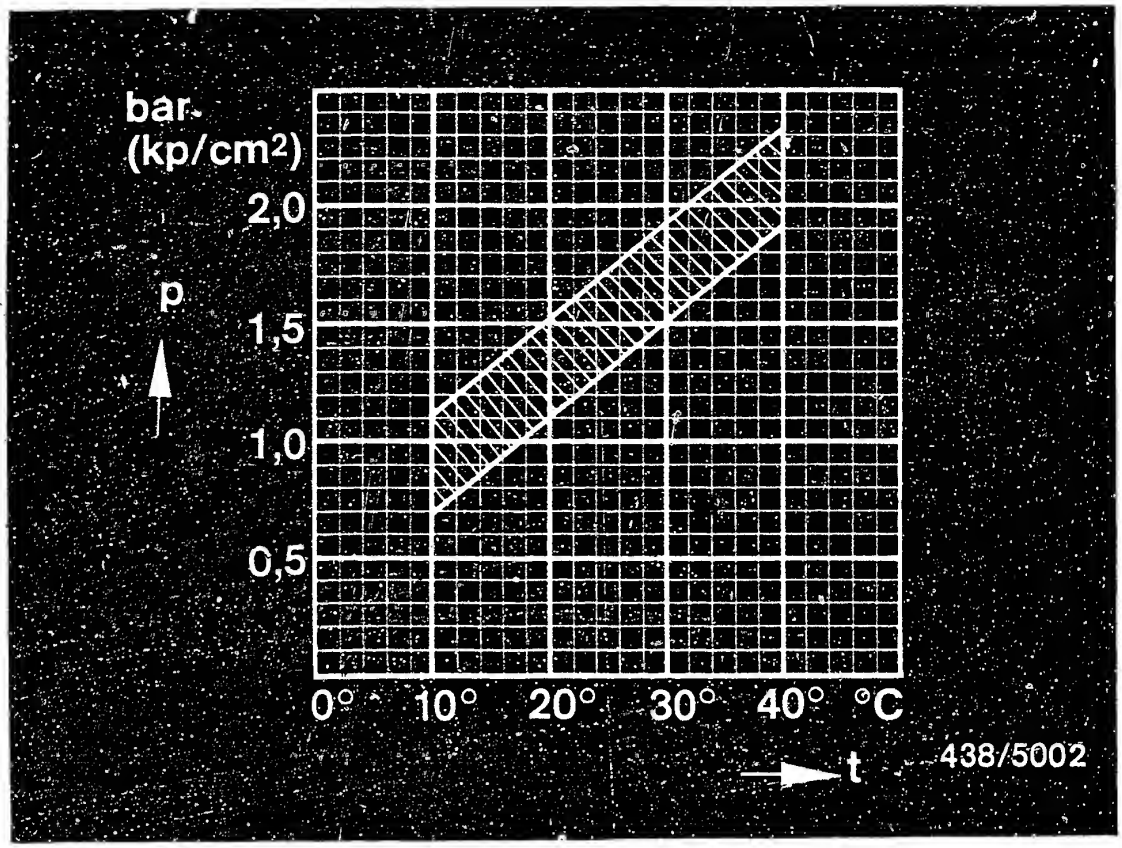
C6

1. Test specifications

1.1 Electric fuel pump

C1

Test step	Test specifications
Fuel delivery	min. 750 cm^3/30 s

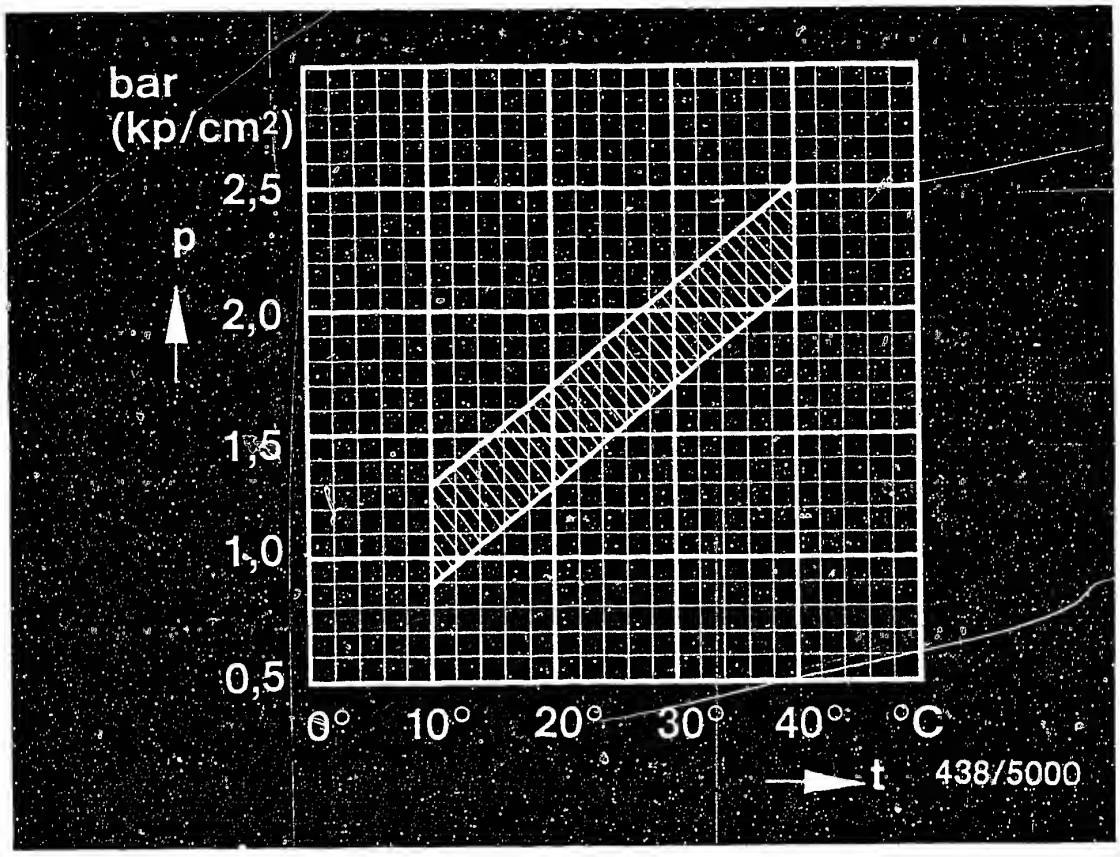


p = Control pressure (gauge pressure)
t = Ambient temperature

C10

1.2 Control pressure "cold"

Part No. of warm-up regulator: 0 438 140 073
(Escort XR 3i)



p = Control pressure (gauge pressure)
t = Ambient temperature

C10

Control pressure "cold"

Part No. of warm-up regulator: 0 438 140 073
(Escort RS 1600i)

Test step	Test specifications

C10

1.3 Control pressure "warm"

Warm-up regulator

0 438 140 011 (RS 1600i) 0 438 140 073 (XR 3i)	3.4...3.8 bar (3.5...3.9 kgf/cm²)

D1

1.4 Primary pressure

Fuel distributor
0 438 100 121

Checking value:	4.7...5.4 bar (4.8...5.5 kgf/cm²)
Setting value:	4.9...5.1 bar (5.0...5.2 kgf/cm²)

D9

1.5 Leak test

Fuel accumulator 0 438 170 029

Minimum pressure after:

10 minutes	2.7 bar (2.8 kgf/cm²)
20 minutes	2.6 bar (2.7 kgf/cm²)

Pressures in the test-specification table are given in bar (gauge pressure) and in kgf/cm² (gauge pressure).

Test step	Test specifications

1.6 Injection valves

E1

Injection valve part no. 0 437 502 015

Opening pressure: 3.0...4.1 bar (3.1...4.2 kp/cm²)

1.7 Fuel distributor

F1

Comparative measurement of fuel deliveries.

Fuel distributor part no.: 0 438 100 121

	Setting point	max. allowable delivery
Idle:	6.0 cm³/min.	6.8 cm³/min.
Part load:	40.0 cm³/min.	44.0 cm³/min.
Full load:	110.0 cm³/min.	120.0 cm³/min.

The full-load delivery (setting point) must be obtained at least from each outlet with maximum deflection of the air-flow sensor plate.

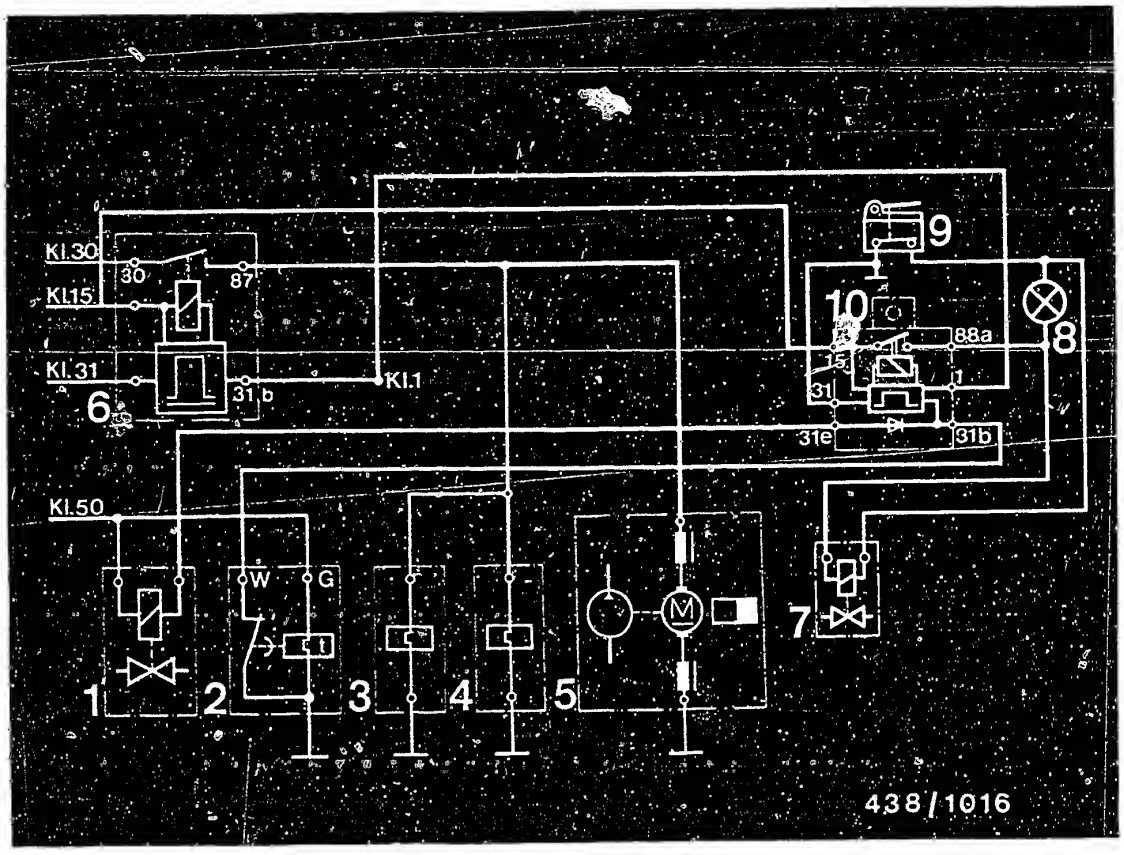
1.8 Idle adjustment

F16

Idle speed: 900...1000 min^{-1}

CO concentration: 0.4...0.8 vol.%CO

Pressures in the test-specification table are given in bar (gauge pressure) or in kp/cm² (gauge pressure).



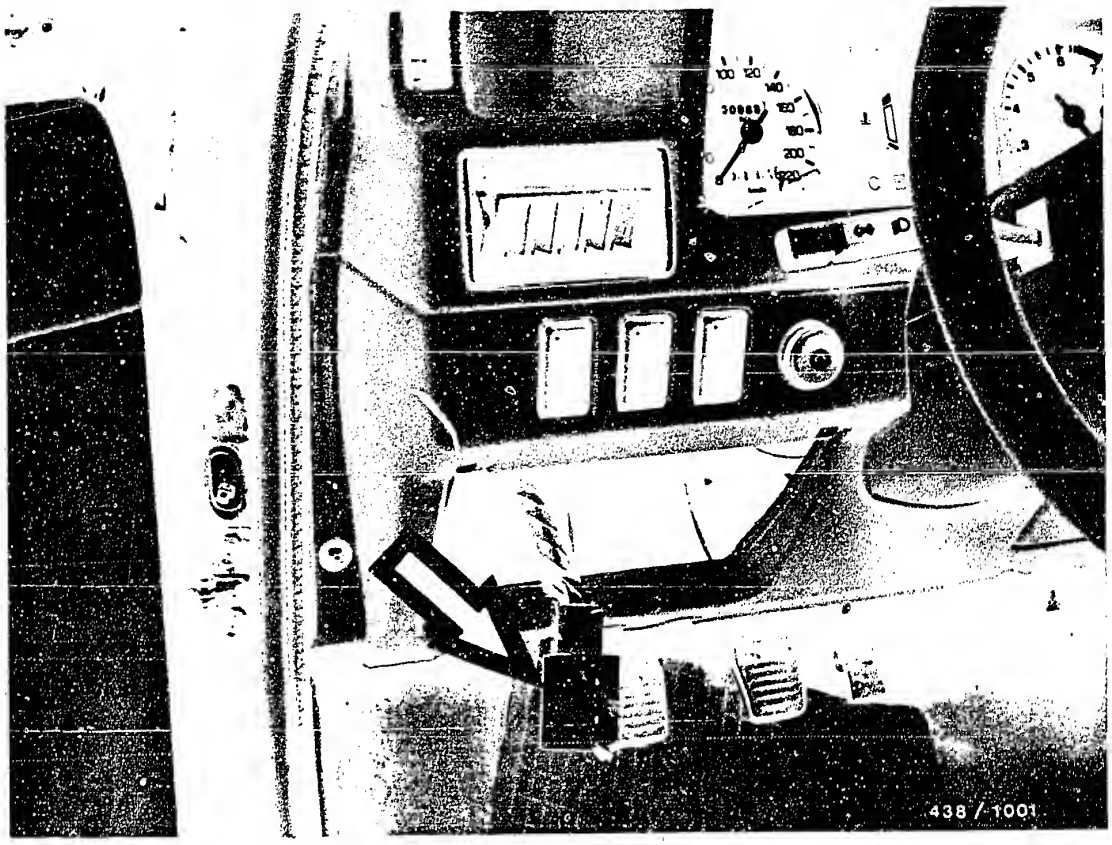
1 = Start valve
2 = Thermo-time switch
3 = Warm-up regulator
4 = Auxiliary-air device
5 = Electric fuel pump
6 = Electronic engine-speed relay
7 = Overrun cutoff valve
8 = Overrun indicator lamp
9 = Throttle-valve switch (insulated stop screw)
10 = Overrun cutoff relay (XR 3i only)

2. Electrical safety circuit

The electric fuel pump, warm-up regulator and auxiliary-air device are energized via an electronic engine-speed relay.

This ensures that, when the engine is stopped and the ignition is switched on, the electric fuel pump cannot start up and the warm-up regulator and auxiliary-air device do not shut off prematurely.

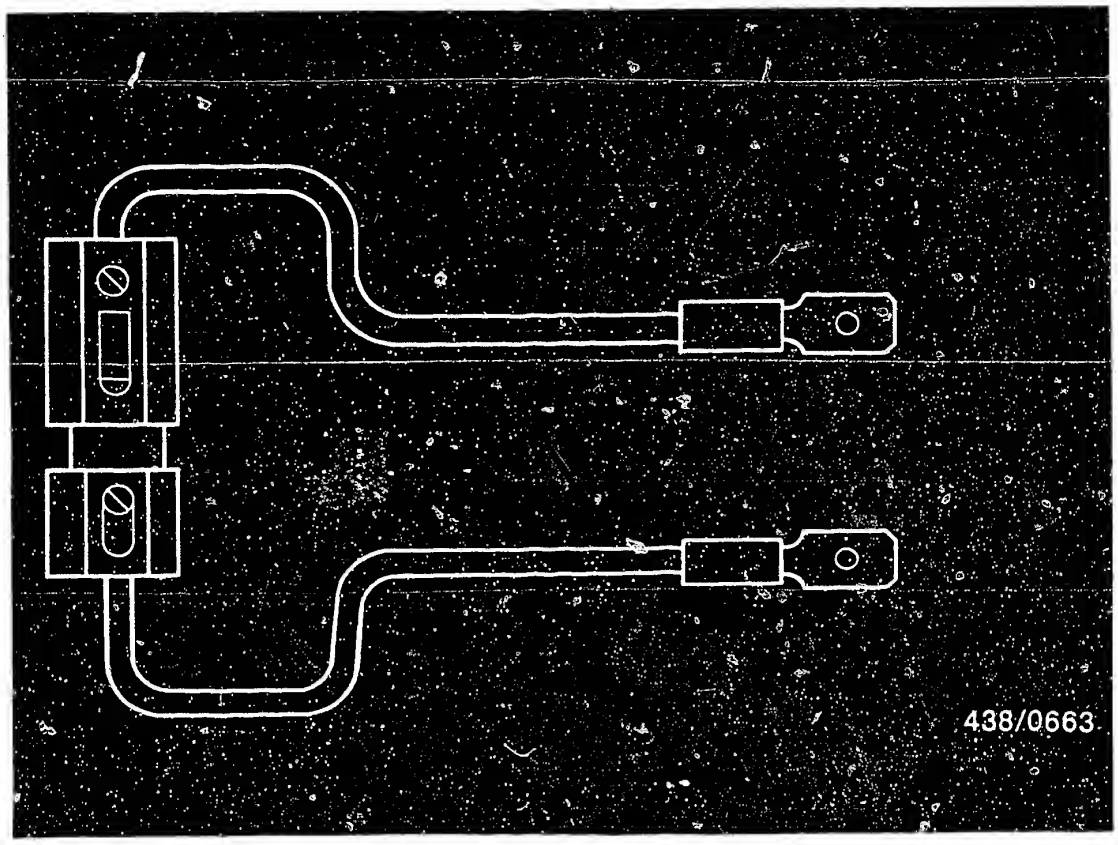
The engine-speed signal for the speed relay is taken from terminal 1 of the ignition system.



Arrow = Speed relay removed

2.1 Electronic speed relay (pump relay)

The relay is in a console to the left of the steering column. In the RS 1600i the console is hidden by a metal plate; in the XR 3i there is a small tray in this place.



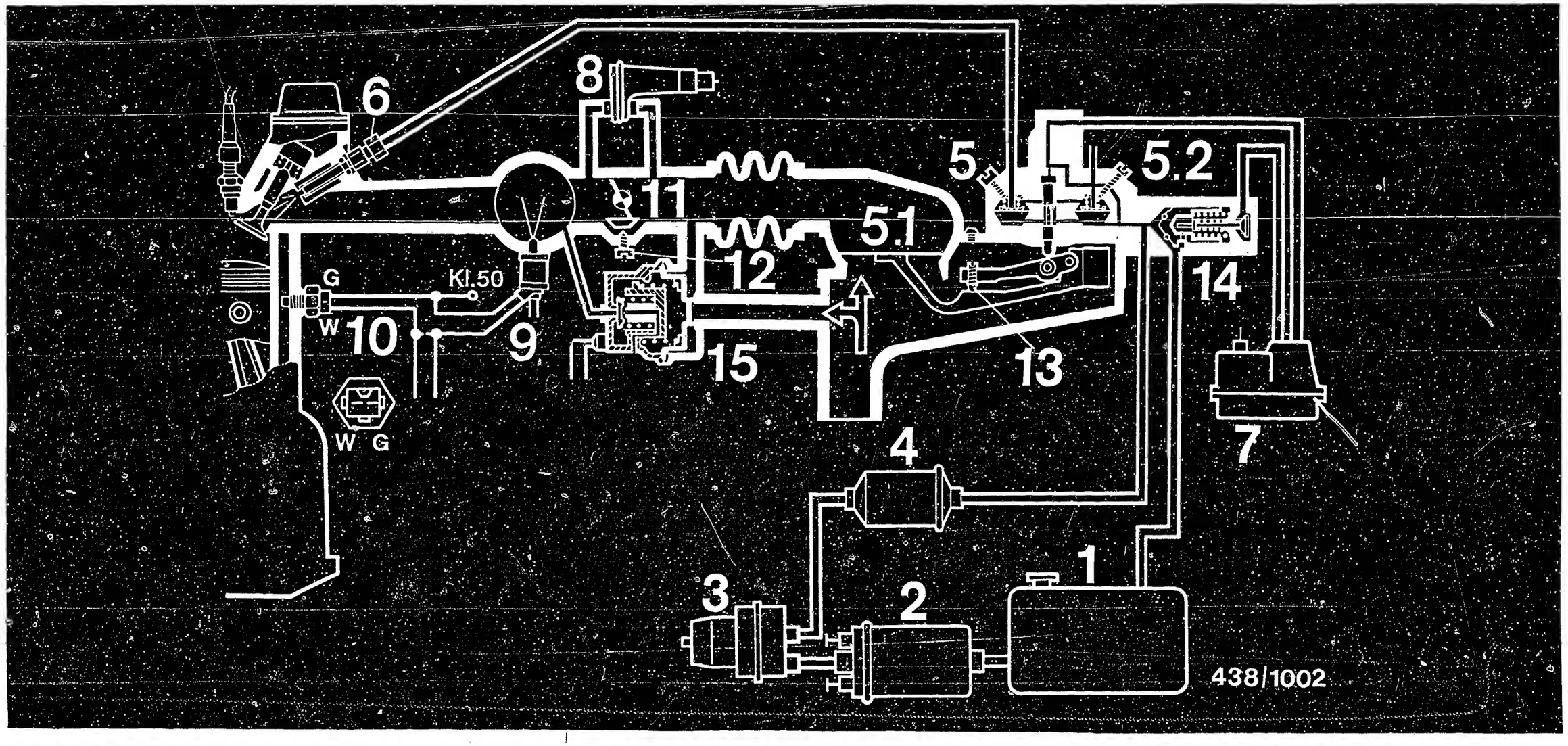
2.2 Bridging the safety circuit for testing

On the XR 3i:

Remove the relay from the console and bridge contacts 30 and 87 using an auxiliary lead. Use auxiliary lead 1.5 mm² with fuse holder and 16 A fuse (to be user-fabricated as per sketch).

2.3 On the RS 1600i:

In the region of the wiper motor there is a free, red electric lead with a pin terminal. To bridge the safety circuit, connect this lead to terminal 15 (red terminal) of one of the two ignition coils. Switch on ignition.



1 = Fuel tank
2 = Electric fuel pump
3 = Fuel accumulator
4 = Fuel filter
5 = Mixture-control unit

5.1 = Air-flow sensor
5.2 = Fuel distributor
6 = Injection valve
7 = Warm-up regulator
8 = Auxiliary-air device
9 = Start valve

10 = Thermo-time switch
11 = Throttle valve
12 = Idle-speed screw (bypass)
13 = Idle-mixture-adjusting screw
14 = Primary-pressure regulator with push-up valve
15 = Overrun cutoff valve

4. General information

4.1 Introduction

These repair instructions refer to the Ford vehicle models

- Escort RS 1600i (85 kW/115 HP) as of 2.1982
- Escort XR 3i (77 kW/105 HP) as of 10.1982

with K-Jetronic.

There are only slight differences in detail between these two vehicle models regarding the engine and the K-Jetronic system.

This manual gives a concise description of the testing and adjustment operations to be performed on the vehicle on the K-Jetronic.

All the system components are dealt with in separate working steps with the corresponding test specifications.

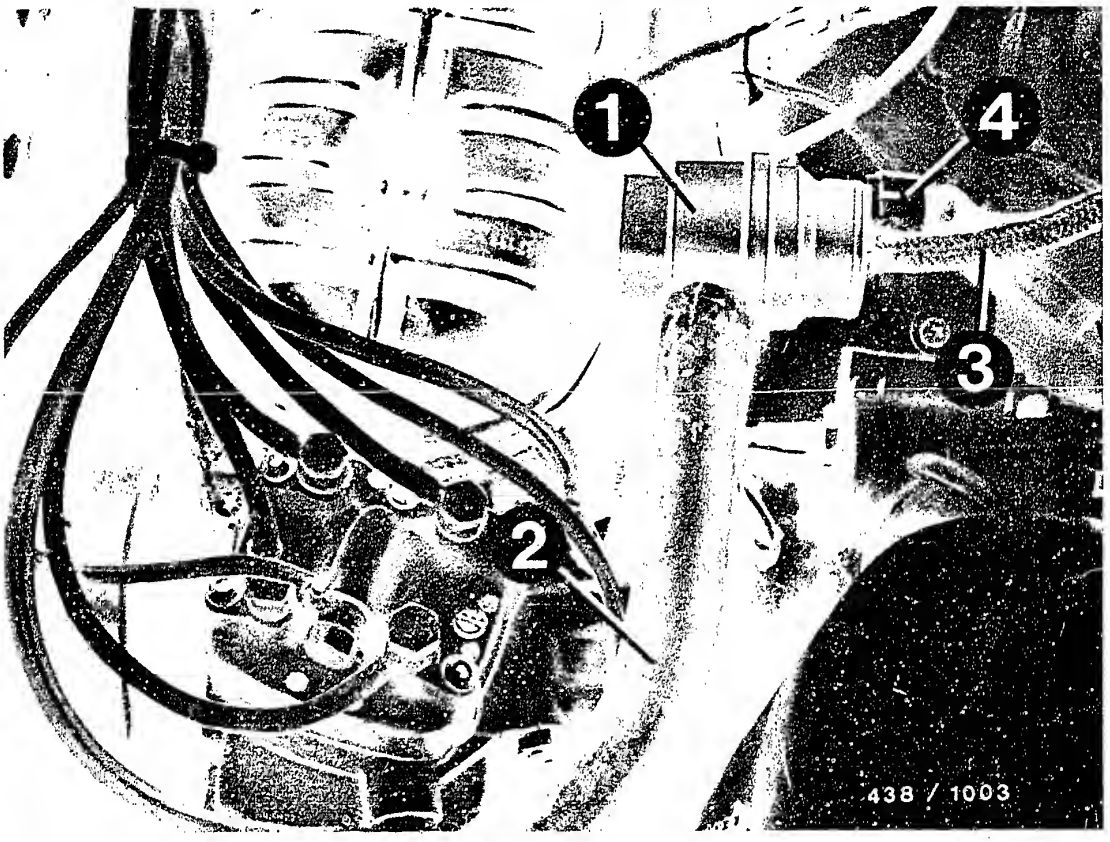
In addition to this repair manual the appropriate testing and repair manuals will, of course, be issued for every other vehicle type equipped with the K-Jetronic.

The K-Jetronic differs from other known fuel-injection systems in terms of both construction and operation. In order to be able to carry out the testing procedures described in this manual - and therefore to be able to assess the components - the K-Jetronic and its operation should be clearly understood. The essential points of the operation and construction of the K-Jetronic are described in Technical Instruction VDT-U 3/1 En.

4.2 Design

The entire system of the K-Jetronic in these vehicle types corresponds, with the exception of the differences listed below, to the basic design as described in Technical Instruction VDT-U 3/1 En.

- Electric fuel pump with replaceable non-return valve.
- Fuel accumulator with doubled storage volume (40 cm^3). The spring chamber is vented to the atmosphere.
- 4-cylinder-mixture-control unit with updraft air-flow sensor.
- Fuel distributor with adjustable differential-pressure valves. In this type of fuel distributor, screw plugs are situated adjacent to the fittings for the fuel-injection lines.
  This possibility for adjustment has only been introduced for production at the works. This does not result in any additional adjustment possibilities for the After-Sales Service Organization. For this reason, the fuel distributor is to be dealt with in precisely the same manner as the conventional model.
  The screw plugs must not be removed or loosened.



1 = Overrun cutoff valve
On the RS 1600i: Connected directly to the air-intake dome above the air-flow sensor.
On the XR 3i: The overrun cutoff valve is inserted directly into the air-filter housing below the air-intake dome.

2 = Hose line
On the RS 1600i: Connected to the air-filter housing.
On the XR 3i: Absent

3 = Vacuum connection

4 = Electric connector

4.3 Other equipment

Both vehicle models are equipped with overrun cutoff. This system ensures that no fuel is injected on the overrun when the throttle valve is closed.

To prevent the engine stopping during coasting and when the clutch is disengaged, the injection of fuel is reinstated before the idle speed is reached.

Operating principle:

The injection of fuel is interrupted by a pneumatically and electrically energized air bypass valve (Bosch product) which is connected in the air-intake system both upstream and downstream of the air-flow sensor. On the overrun this valve is opened so that the intake air does not flow through the air-flow sensor, but through the valve. Consequently, the air-flow sensor plate falls back onto its mechanical stop, the metering slits in the fuel distributor are closed - and injection is thus interrupted.

The air bypass valve is switched by the application of vacuum from the intake system of the engine whereby the application of vacuum is controlled by a solenoid-operated valve (contained in the air bypass valve).

On the Escort XR 3i the solenoid-operated valve receives its positive electrical energization from a separate engine-speed relay (Bosch product).

The negative connection is via an insulated idle stop on the throttle-valve assembly which acts as a switch and is closed when the throttle valve is closed.

On the Escort RS 1600i the overrun cutoff system - with the exception of the positive energization for the by-pass valve - is identical. The positive connection comes from the control unit of the electronic ignition system installed in this vehicle model (not a Bosch product). There is no separate engine-speed relay as in the Escort XR 3i.

The overrun cutoff is inoperative when the engine is cold and during the warm-up period.
The system is rendered inoperative under these conditions in the XR 3i by the engine-speed relay (overrun cutoff relay) as a function of the switching point of the thermo-time switch, i.e. up to an engine temperature of approx. +35°C.
On the RS 1600i the overrun cutoff is suppressed by the ignition control unit up to approx. +55°C.

5. Test equipment and tools

- Pressure tester KDJE-P 100 (previously KDEP 1034)

  For testing all fuel pressures and testing for leaks.

- Adjusting wrench KDEP 1035

  For adjusting the idle-mixture-adjusting screw in the mixture-control unit (CO-adjustment).

- Guide ring KDEP 1040/10 (dia. 80 mm)

  For centering the air-flow sensor plate in the air-flow sensor.

- Tester for delivered quantity comparison KDJE-P 200 (previously KDJE 7451)

  For comparing the fuel delivered from the individual fuel-distributor outlets.

- Electric connecting cable (test lead)

  KDJE 7450/70 for the direct connection of components to be tested, e.g. cold-start valve.

- Graduate (commercially available, capacity approx. 1.5 l)

  For measuring the delivery of the electric fuel pump.

- Valve tester KDJE-P 400 (previously KDJE 7452).

  For testing the injection valves.

Test media: Calibrating fluid (Shell K 30, Esso-Varsol, Shell Mineral Spirits 135)
or
Bosch, Part Designation VS 14942-CH
Previously Part No. 5 973 340 650
The Bosch calibrating fluid can be obtained in 5 l metal cans from the following supplier:
Firma
Oskar Gnamm GmbH & Co
D-7531 Kämpfelbach-Bilfingen

Caution:
For safety reasons, never use normal gasoline or similar easily inflammable and combustible liquids.
Even with calibrating fluid, be sure to observe the local official regulations.

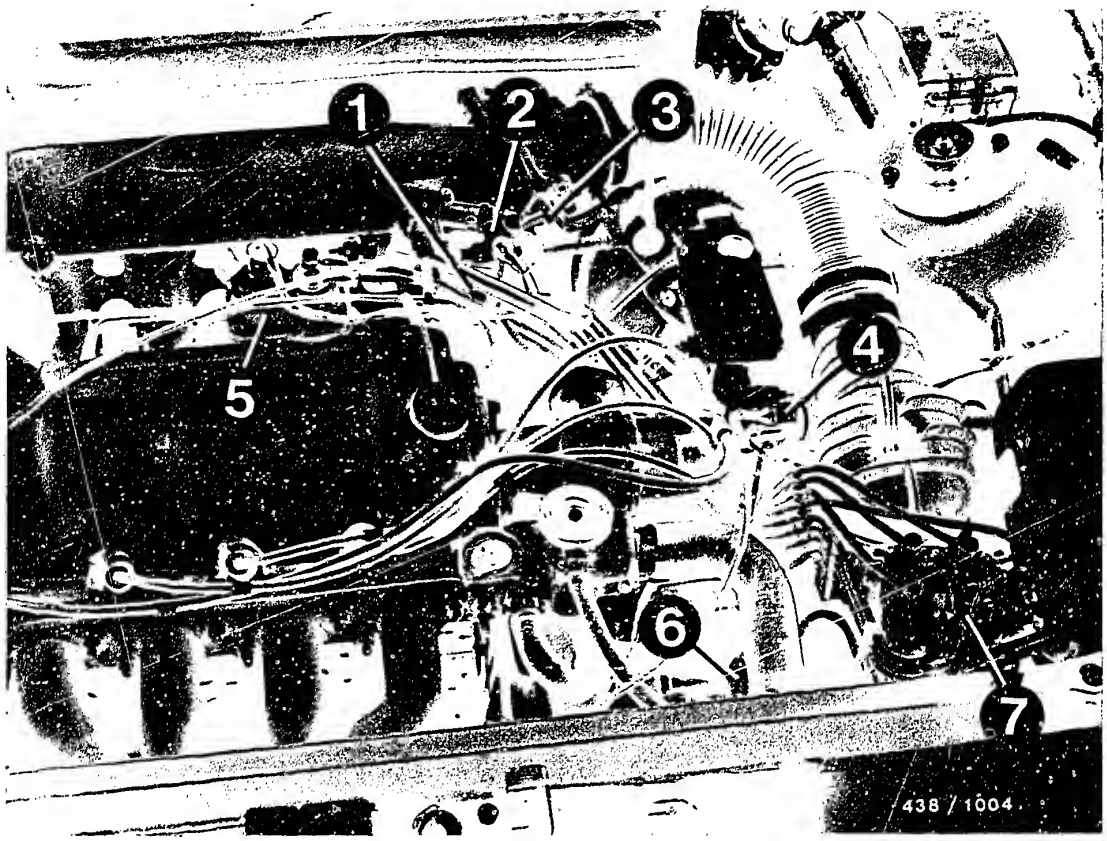
- Tachometer (commercially available)

  For idle-speed adjustment.

- CO meter (commercially available)

  For idle-speed CO adjustment.

- Set of tools for the removal and fitting of idle-speed anti-tamper device of air-flow sensor.
  (e.g. No. 4521/7 from the firm Hazet, D-5630 Remscheid).

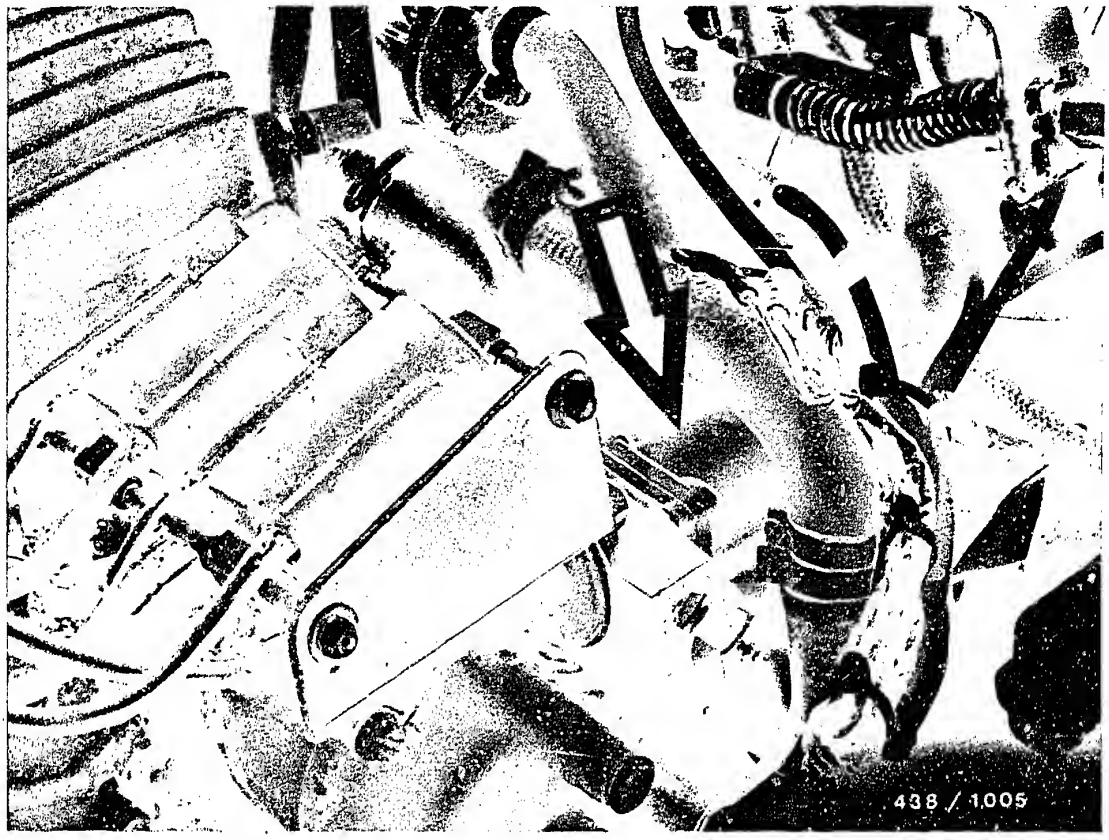


1 = Auxiliary-air device, partially hidden by lines
2 = Start valve
3 = Throttle-valve stop screw, acting as idle switch (insulated)
4 = Overrun cutoff valve
5 = Warm-up regulator, installation position on XR 3i
6 = Fuel filter
7 = Mixture-control unit

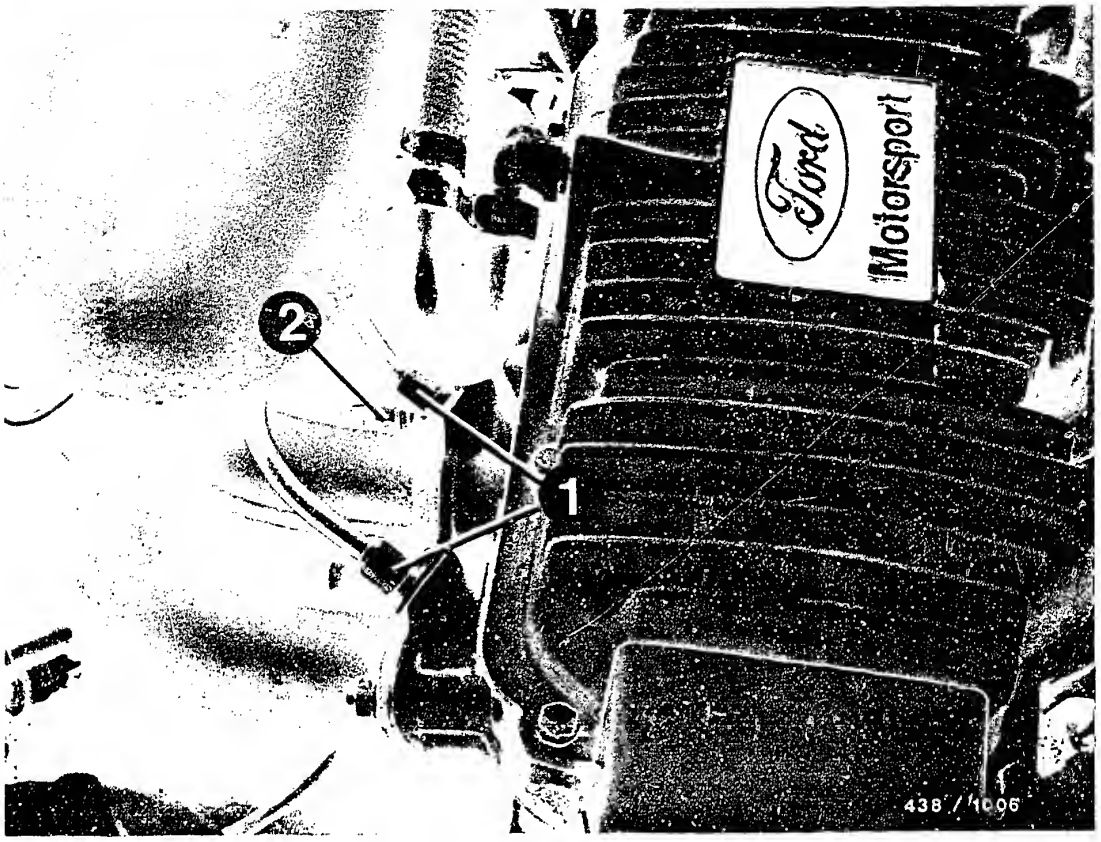
6. Installation position of individual components

(Picture of XR 3i)

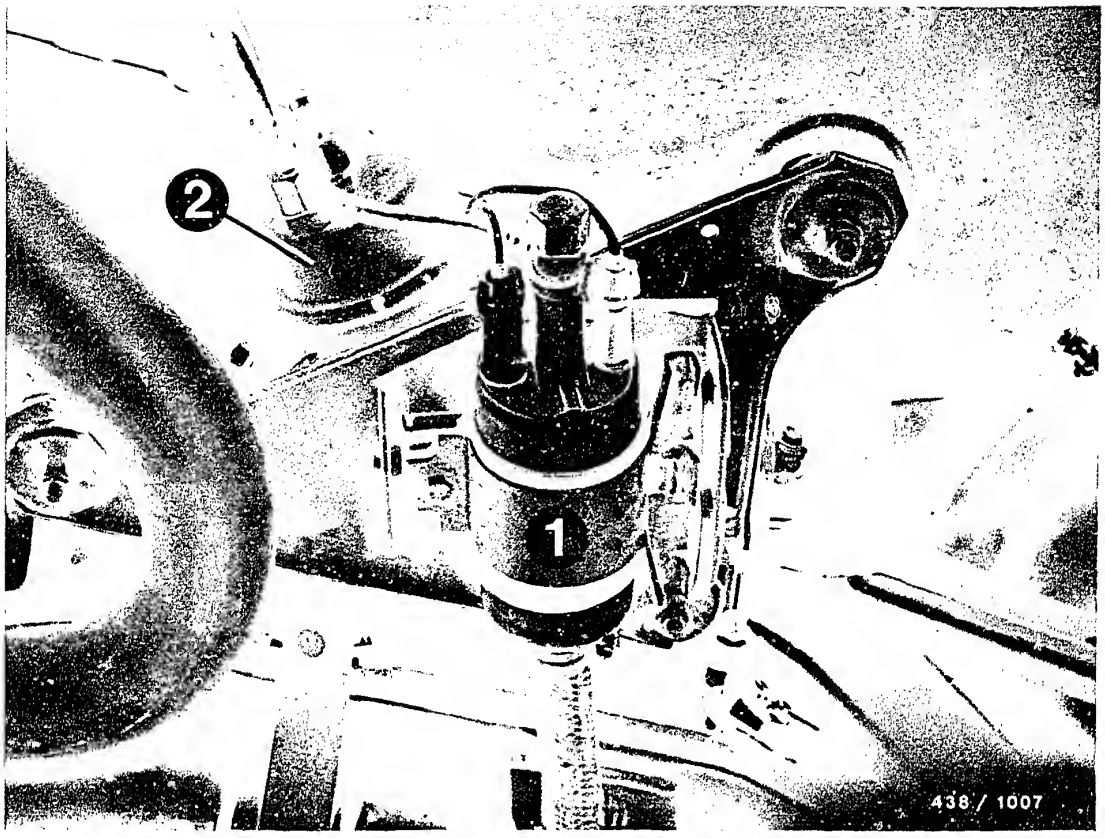
6.1 Arrangement of components on engine



Arrow = Warm-up regulator on RS 1600i



1 = Injection valves (2 valves hidden)
2 = Thermo-time switch



1 = Electric fuel pump
2 = Fuel accumulator

6.2 Fuel-supply components

Both components are mounted on a common bracket on the floor assembly behind the fuel tank.

7. Trouble-shooting chart

When trouble-shooting the K-Jetronic, it is assumed that the ignition is in order and that the engine is in proper mechanical condition.

The individual test steps of this repair manual are detailed and self-contained. This permits direct trouble-shooting without having to go through the entire test program for each fault.

The trouble-shooting chart on Coordinates B 2- B 5 is intended to make it easier to decide which test steps have to be carried out for certain faults.

According to the symptom stated by the customer or which you yourself have determined, select the possible cause in the trouble-shooting chart. The coordinate at the end of the cause column refers to the appropriate test step with the associated test specification.

Important note:

If any fuel connections are loosened, parts removed, also on the vacuum system, always use new seals when re-connecting or re-installing.

Trouble-shooting chart (see also Coordinates B 4/B 5)

Customer complaint (fault symptom)

1. Engine does not start, or starts poorly, in cold condition
2. Engine does not start, or starts poorly, in warm condition (hot-starting difficulties*)
3. Irregular idling during the warm-up phase (shakes)
4. Irregular idling with warm engine (shakes)
5. Engine does not draw gas, burbles
6. Engine misfires when operating on the road, high load
7. Insufficient power

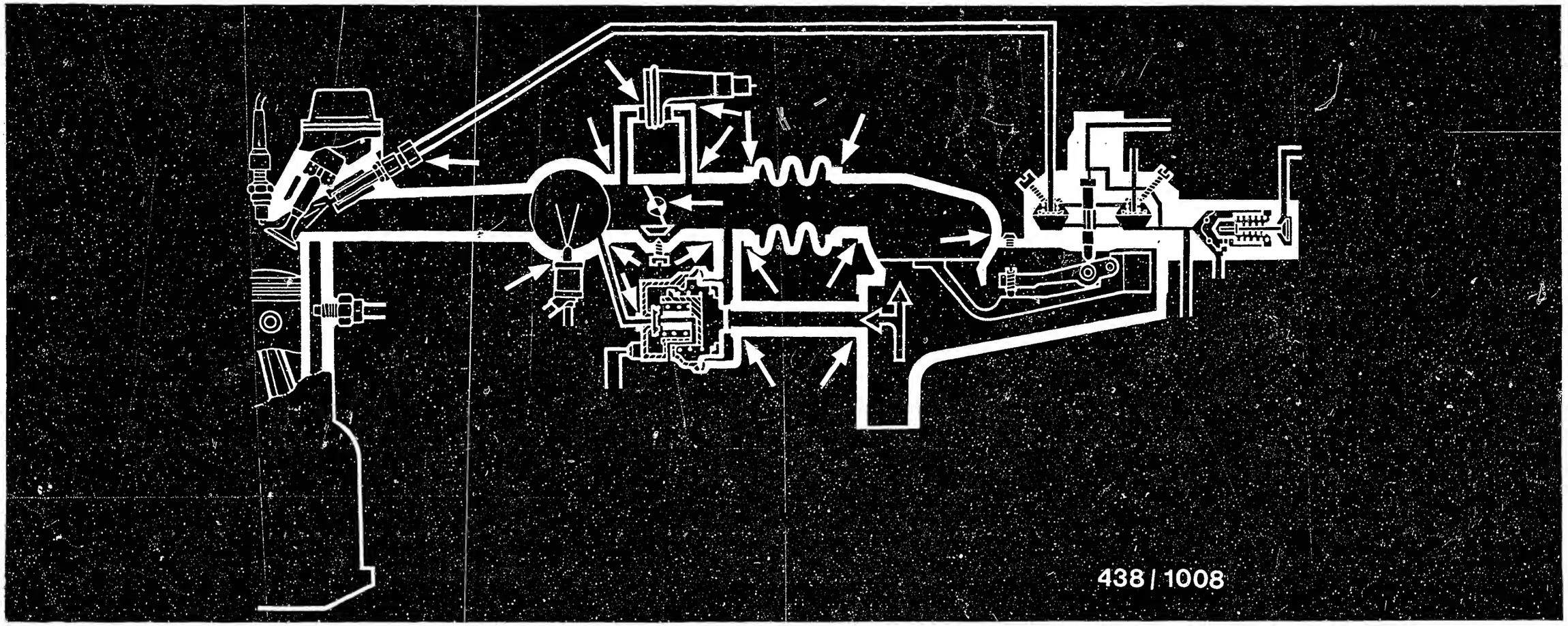
1	2	3	4	5	6	7	Cause	Coordinates
	●	●	●	●		●	Vacuum system leaking	B 6
●	●		●	●	●	●	Air-flow sensor lever and/or control plunger not moving smoothly	B 8
	●						Position of the air-flow sensor plate incorrect	B 17
●		●					Auxiliary-air device does not open	B 22
●	●				●		Electric fuel pump not operating	C 1
●							Cold-start system defective	C 6
		●	●				Cold-start valve leaking	C 8
				●			Excessive fuel delivery for control-pressure circuit	C 12
●		●					"Cold" control pressure outside tolerance	C 10
	●		●	●	●	●	"Warm" control pressure too high (after warm-up)	C 10
			●	●		●	"Warm" control pressure too low (after warm-up)	C 10
					●	●	Primary (system) pressure outside tolerance	D 1
	●						Overall fuel system leaking	D 9
●	●	●	●		●		Injection valves leaking, opening pressure too low	E 1
●	●	●	●			●	Unequal fuel delivery (imbalance of fuel delivery)	F 1
●	●	●	●	●			Basic idle adjustment incorrect	F 16
						●	Throttle plate does not open completely	----
	●		●	●			Overrun cutoff valve leaking	A 16

*Note:
If, in the case of Symptom 2, after checking and repairing all the fault causes listed below, the hot-start characteristic is still unsatisfactory this can be improved by fitting an impulse relay.
The fitting of this relay is described in Coordinate L 5

Customer complaint (fault symptom) (continued)

8. Engine runs on after being switched off ("diesels")
9. Fuel consumption too high
10. Flat spot during acceleration
11. CO concentration during idling too high
12. CO concentration during idling too low
13. Idle-speed cannot be adjusted (too high)
14. Engine starts but then immediately stops

8	9	10	11	12	13	14	Cause	Coordinates
		●		●			Vacuum system leaking	B 6
●		●	●	●			Air-flow sensor lever and/or control plunger not moving smoothly	B 8
●							Position of the air-flow sensor plate incorrect	B 17
			●		●	●	Overrun cutoff valve leaking	A 16
					●		Auxiliary-air device does not close	B 22
						●	Electric fuel pump not operating	C 1
							Cold-start system defective	C 6
●	●		●				Cold-start valve leaking	C 8
		●				●	Excessive fuel delivery for control pressure circuit	C 12
		●				●	"Warm" control pressure too high (after warm-up)	C 10
	●	●	●			●	"Warm" control pressure too low (after warm-up)	C 10
		●				●	Primary (system) pressure outside tolerance	D 1
							Overall fuel system leaking	D 9
●							Injection valves leaking, opening pressure too low	E 1
		●					Unequal fuel delivery (imbalance of fuel delivery)	F 1
●	●	●	●	●			Basic idle adjustment incorrect	F 16
							Throttle plate does not open completely	----



Working steps

8. Check the air-intake system of the engine for leaks.

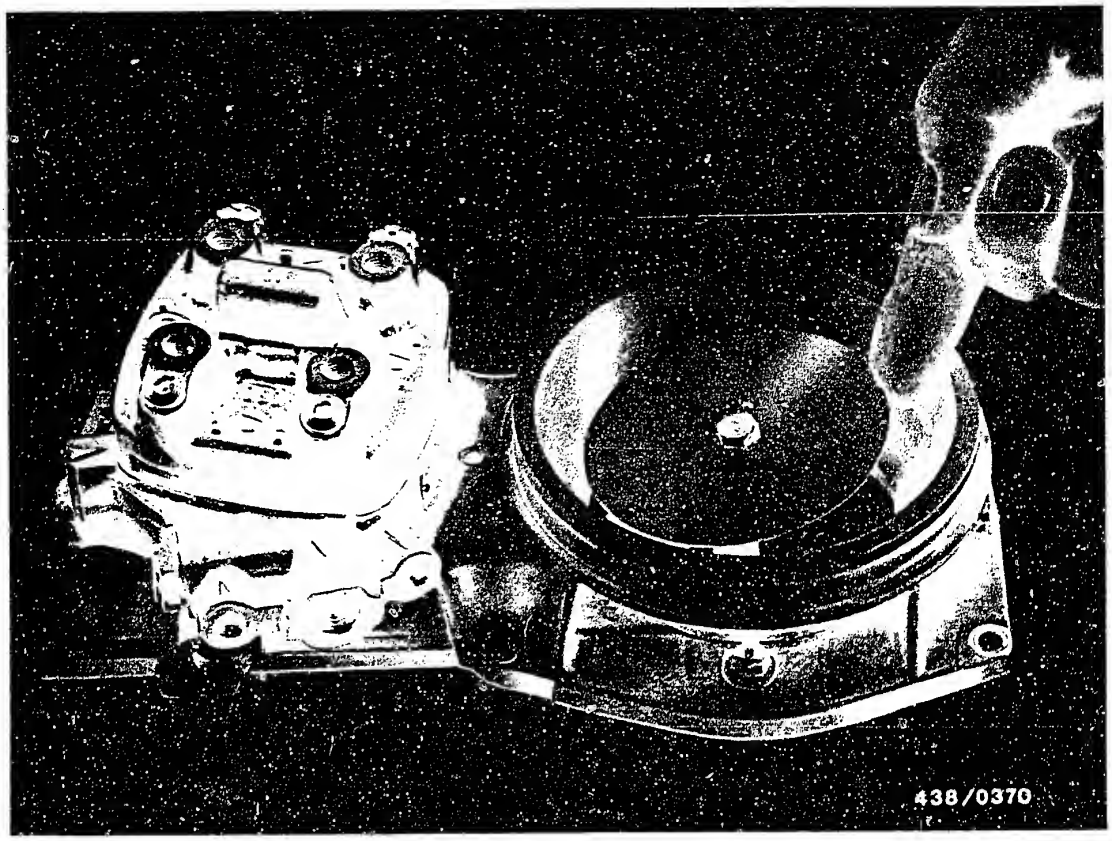
The arrows in the diagram show typical points where leaks can occur.
Check by performing a visual inspection or, in cases of doubt, as follows: Disconnect the hose from the outlet of the auxiliary-air device and blow air through this hose into the intake system using a compressed-air gun. The throttle valve is to be fully open. Brush connection points with soapy water, or spray with leak detector (e.g. Güpoflex).

Under no circumstances may combustible liquids be used when testing for leaks.
The formation of bubbles or foam indicates a leak.
If a leak has been eliminated, it is necessary finally to adjust the idle speed with the engine at normal operating temperature:
Idle-speed adjustment is described on Coordinates F 16.

9. Check the control lever in the air-flow sensor and the control plunger in the fuel distributor for ease of movement.

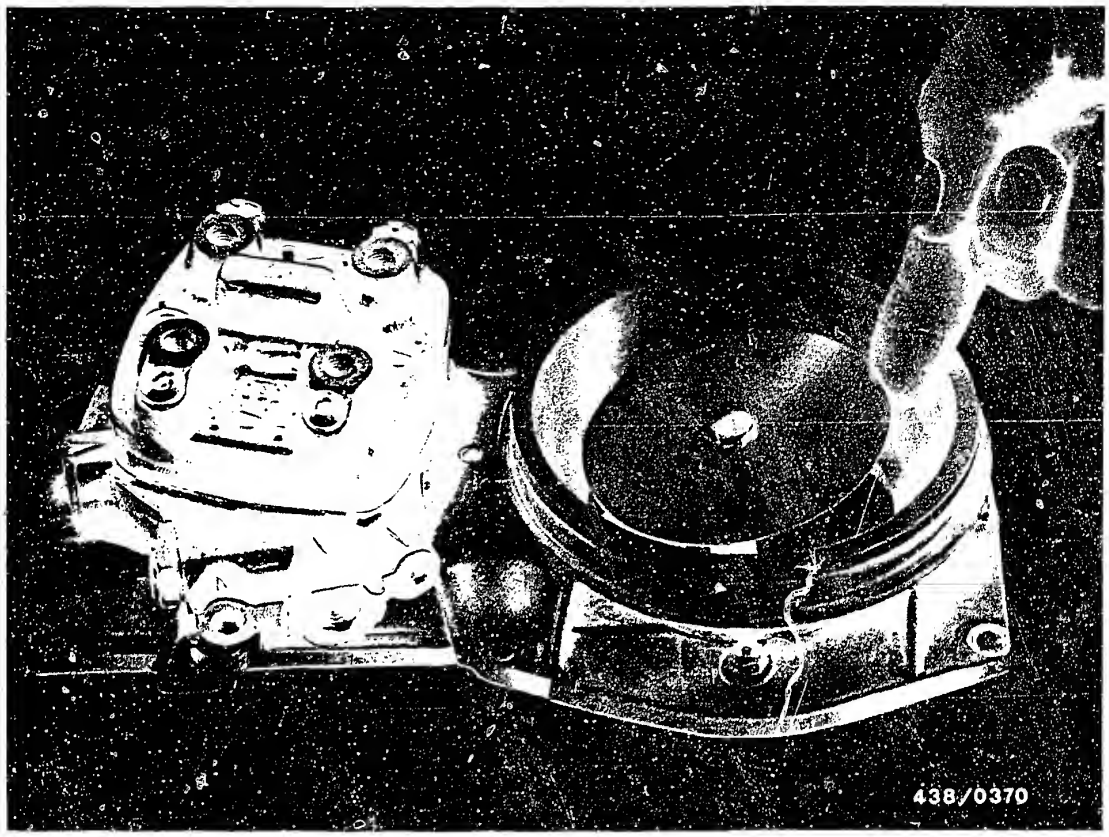
9.1 Preparations

- Engine temperature not below +20°C.
- Remove the rubber hood so that the air-flow sensor plate becomes accessible.
- Switch on the electric fuel pump for approx. 10 seconds by bridging the safety circuit.
  This results in application of the control pressure to the control plunger in the fuel distributor.



9.2 Check that the control lever moves freely

Raise the air-flow sensor plate by hand (updraft) and release again. The sensor plate snaps back into the zero position and bounces up about twice from the spring-loaded stop. If the control lever does not move freely, first release all fastening screws holding the air-flow sensor to determine whether housing deformation is the cause of the problem.
If the problem is solved by loosening the fastening screws, the seal between the air-supply housing and air-flow sensor should be changed (Ford parts).
Tighten the screws uniformly cross-wise to a torque of 9...10 Nm (0.9...1.0 kgfm).
If the housing is not deformed, then the air-flow sensor must be repaired or replaced.



9.4 Check that the control plunger moves freely

Raise the air-flow sensor plate by hand (updraft). The same resistance must be felt over the entire movement.

Move the sensor plate rapidly back to a position just in front of the zero stop. The control plunger follows only sluggishly, but must make noticeable contact with the sensor plate lever. If this condition is fulfilled, the control plunger can be considered to move freely.

If the control plunger does not move freely, remove the fuel distributor from the air-flow sensor.

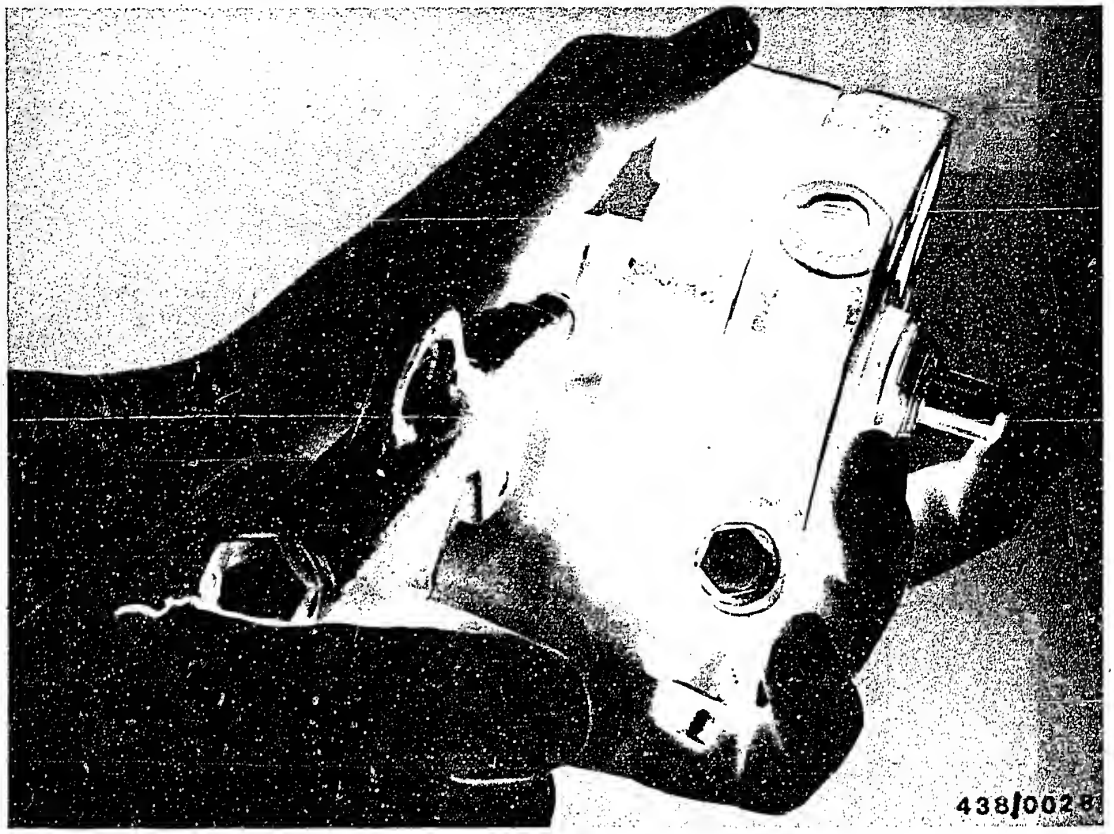
Important!

Note the following when installing fuel components and fuel lines:

Always ensure utmost cleanliness when loosening or tightening the fuel connections. No dirt must enter the fuel system.

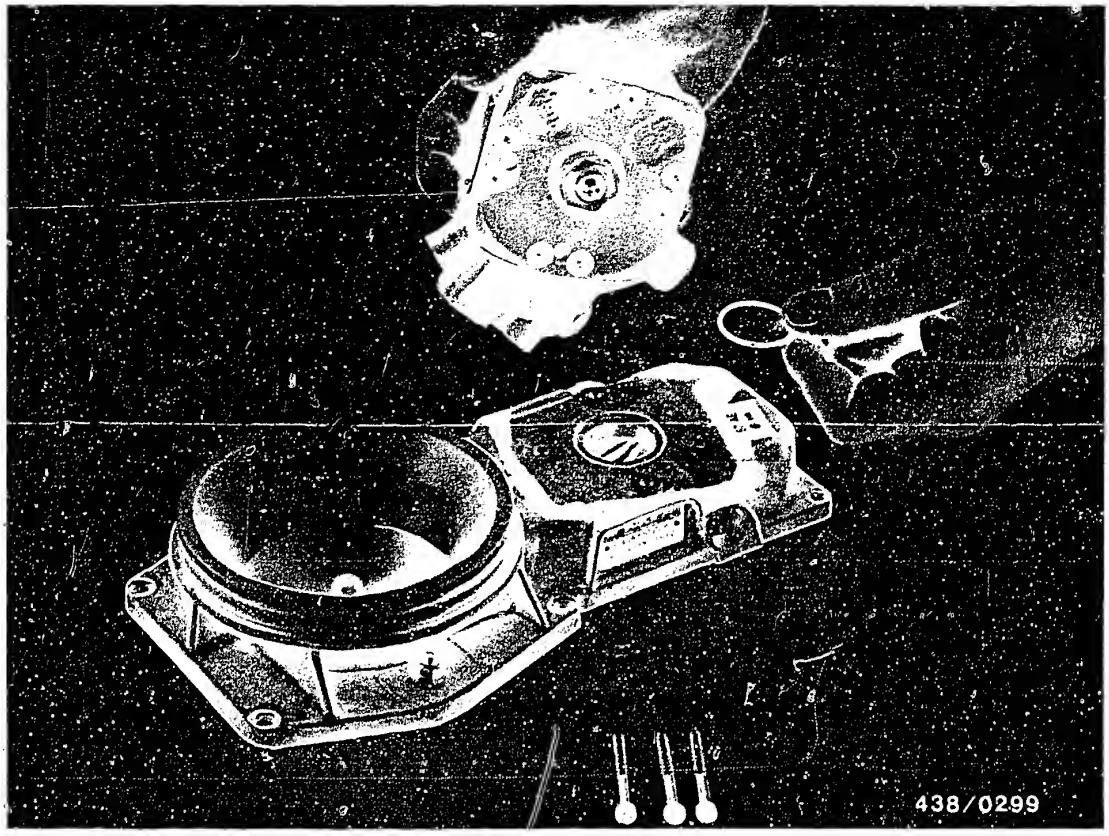
When loosening or tightening the fuel connections, apply counter-force at the fixed hexagon of the component.

Clean the fuel distributor thoroughly in the region of the fuel connections. Screw off all connections.



Screw out three fastening screws and remove the fuel distributor from the air-flow sensor.

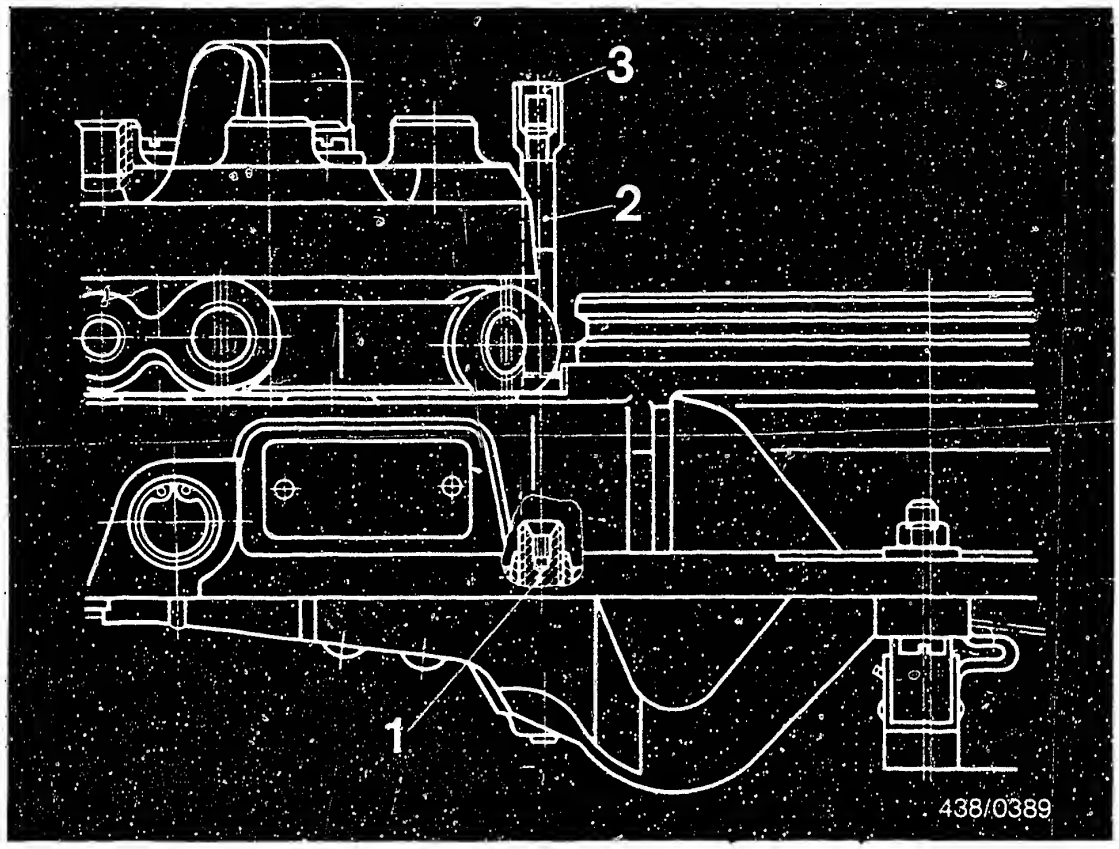
Remove the plunger. Under certain conditions, in order to do this it may be necessary to blow compressed air briefly against the plunger through the control-pressure connection hole. Hold the plunger with your hand while doing this. Clean the plunger thoroughly with benzine. If the plunger still does not move freely, replace the fuel distributor



9.4 Fitting the fuel distributor

When fitting the fuel distributor, use a new seal ring between fuel distributor and air-flow sensor.
Observe the tightening torque 3.2...3.8 Nm (0.32... 0.38 kgfm) for the fastening screws precisely.

When connecting the fuel-injection tubing, use new seal rings.

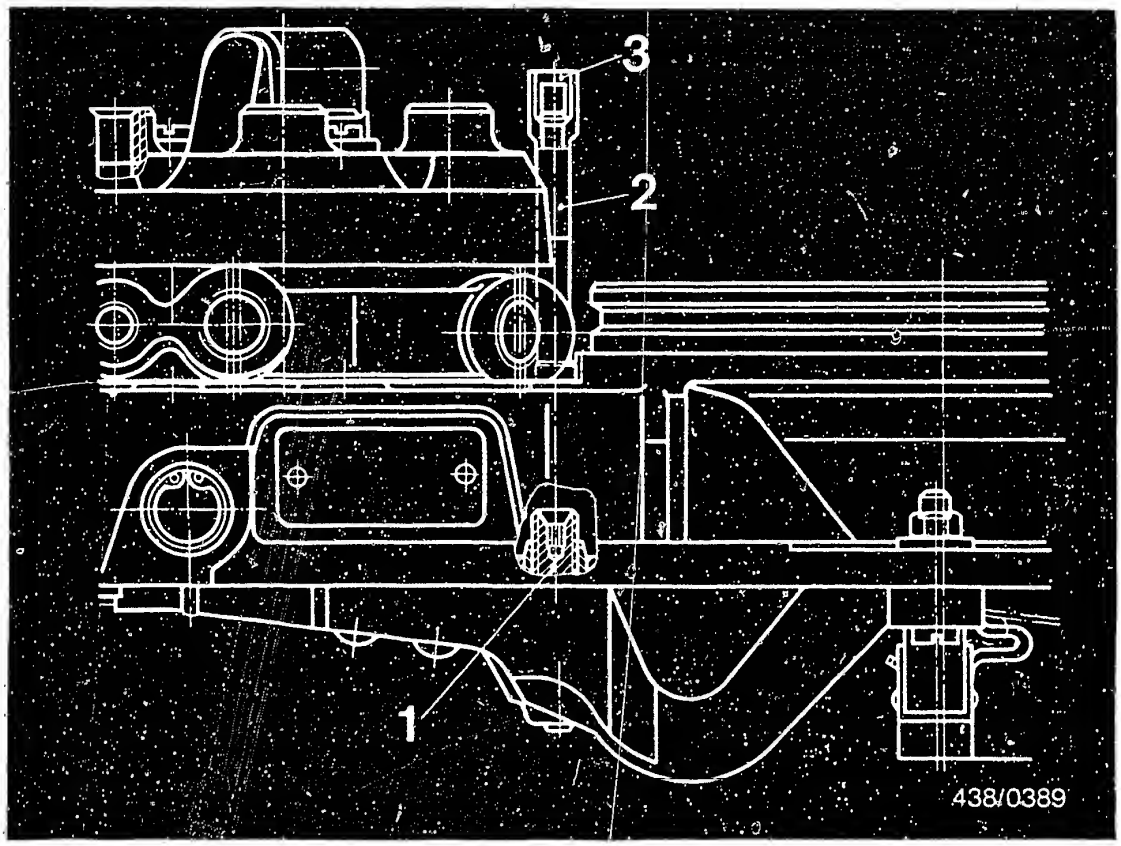


1 = Mixture-control screw
2 = Guide tube
3 = Lead seal

9.5 Matching the fuel distributor to the air-flow sensor for initial starting

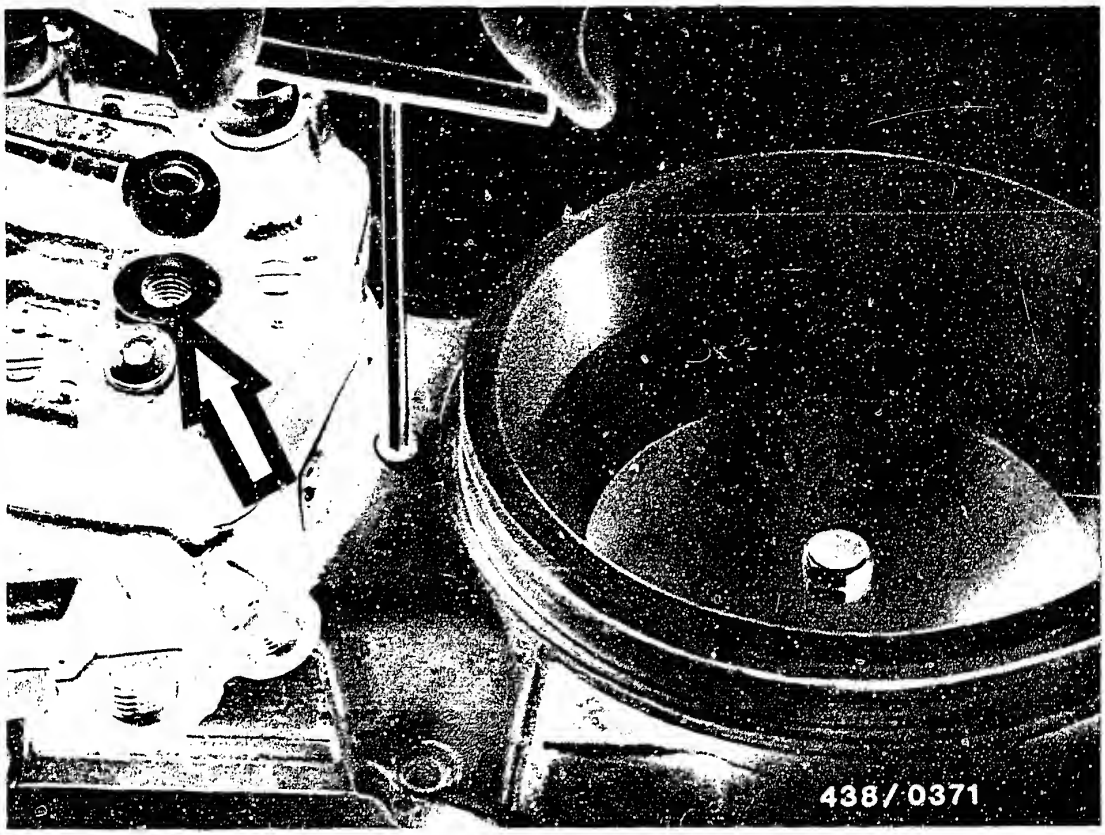
Screw off one fuel-injection line from the fuel distributor.
Bridge the electrical safety circuit so that the electric fuel pump operates.

The idle-mixture-adjusting screw is adjusted via a guide tube rigidly fitted on the mixture-control unit.



1 = Idle-mixture-adjusting screw
2 = Guide tube
3 = Lead seal

Remove anti-tamper device (lead seal) of the idle-mixture-adjusting screw. Introduce adjusting wrench KDEP 1035 through the hole into the idle-mixture-adjusting screw.



Screw in the idle-mixture-adjusting screw slowly and without exerting any great pressure on the adjusting wrench until fuel is just delivered from the open outlet (arrow) of the fuel distributor. Then turn back the idle-mixture screw by 1/2 turn.

Re-connect the fuel-injection line to the fuel distributor, start the engine and warm up.

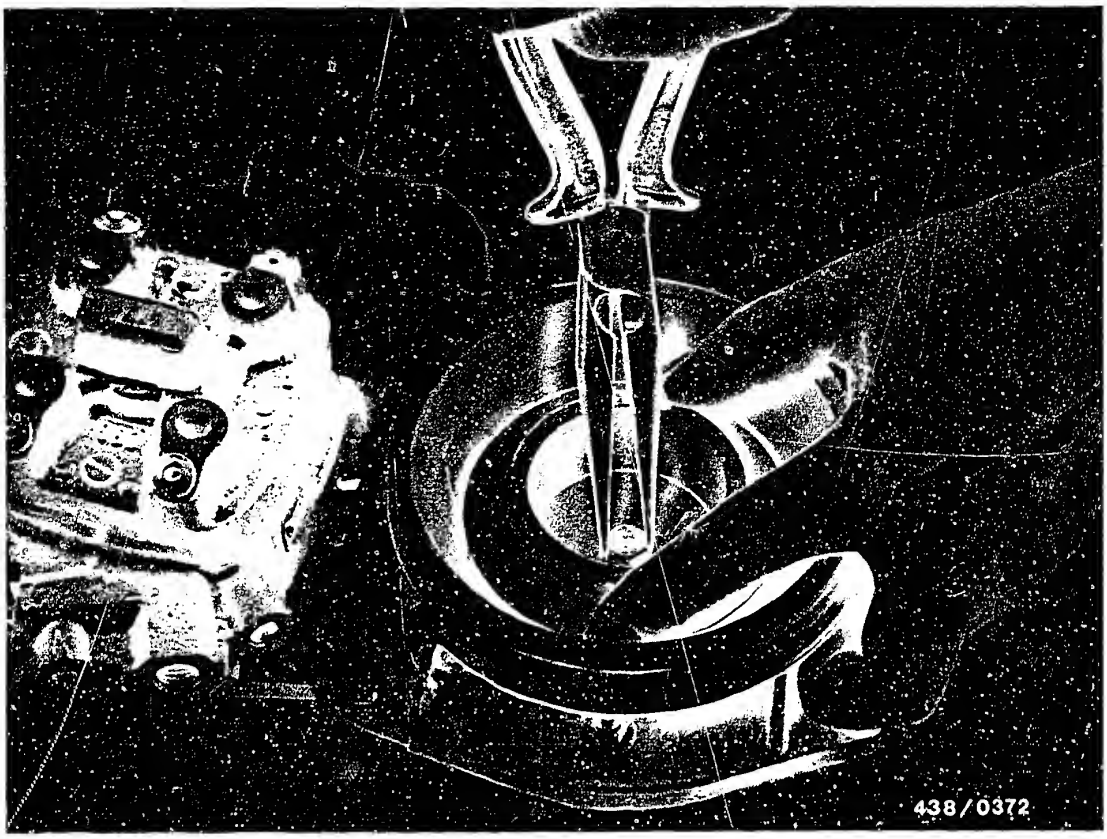
The final matching of air-flow sensor and fuel distributor is carried out by adjusting the idle speed with the engine at normal operating temperature.

Idle-speed adjustment is described on Coordinates F 16.

10. Checking and adjusting the position of the air-flow sensor plate

10.1 Preparations

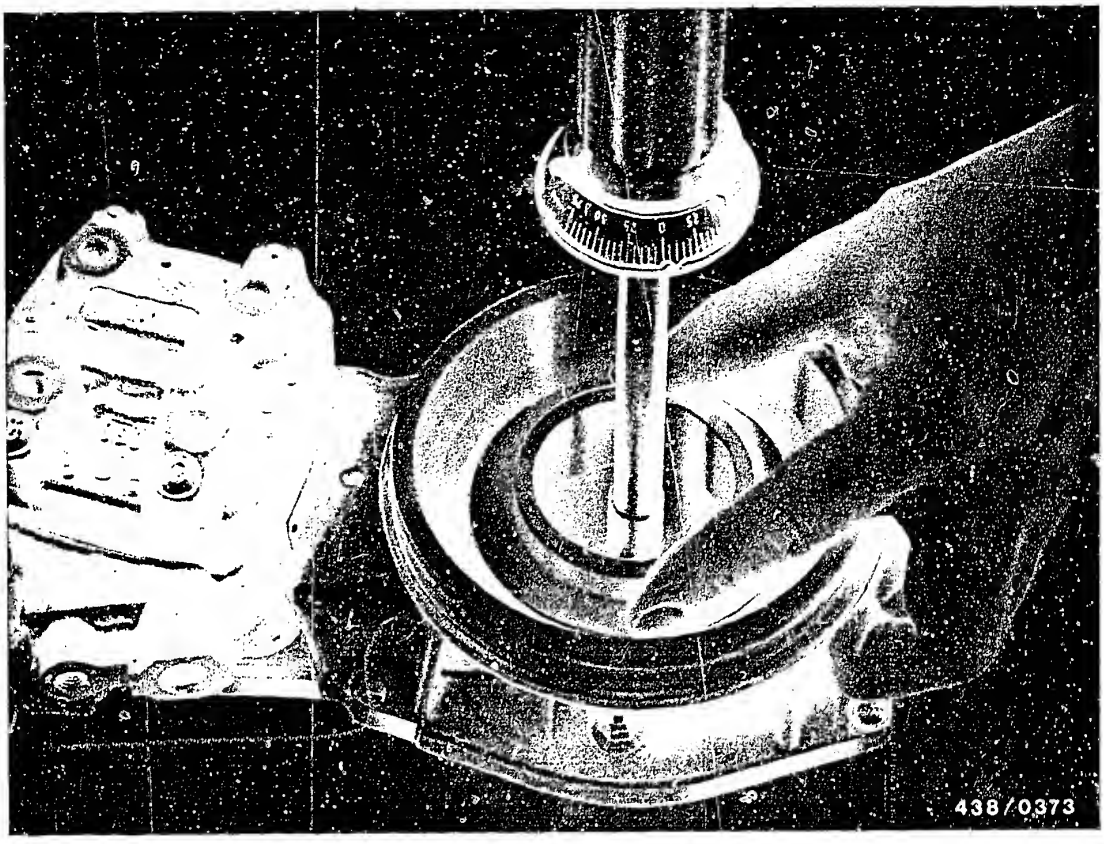
- Engine temperature is not important.
- Remove the rubber hood fitted between the air-flow sensor and the throttle-valve assembly (release 2 clamping bands), so that the air-flow sensor plate becomes accessible.



10.2 Centering the air-flow sensor plate

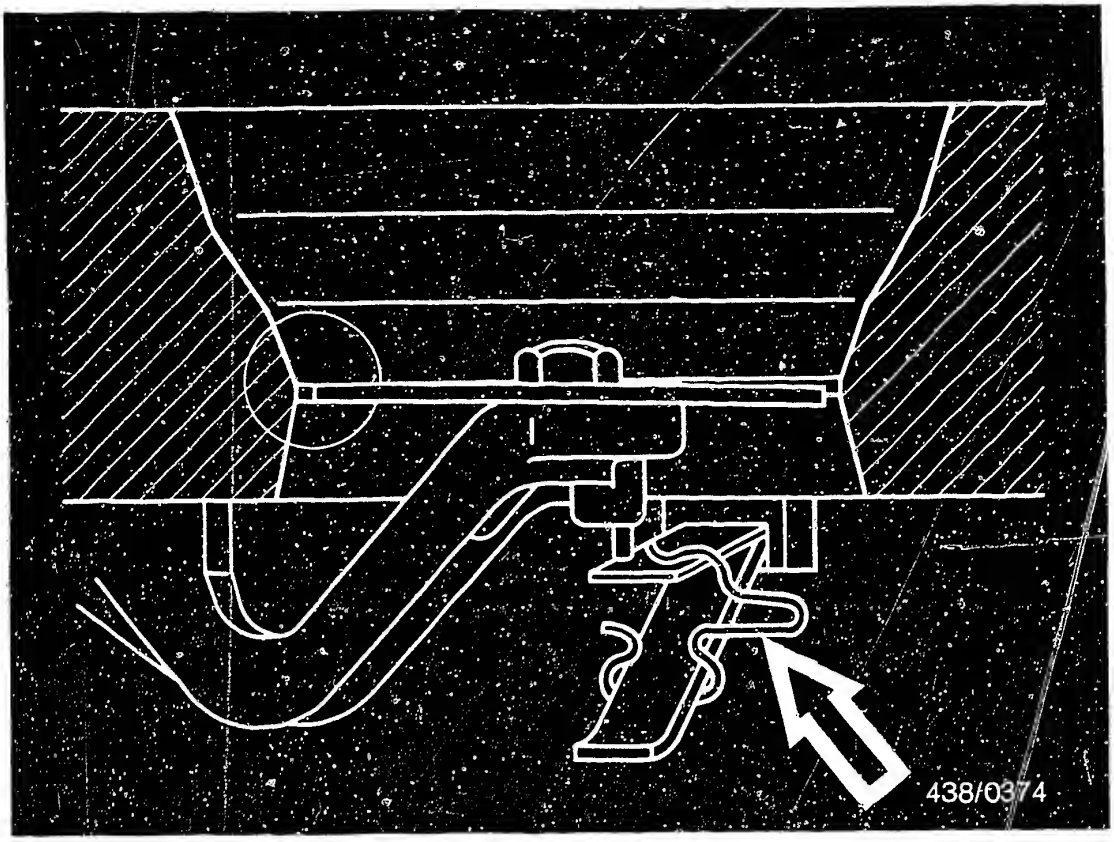
Check that the sensor plate is flat (not bent) and that it can move through the narrowest part of the air funnel without touching the funnel. If necessary, center it using a positioning ring KDEP 1040/10 (dia. 80 mm) as follows:

Loosen the sensor plate fastening screw. Insert the positioning ring while holding the fastening screw with pliers so that the sensor plate does not deflect downwards.



With the positioning ring in place, tighten the fastening screw with a torque of 5.0...5.5 Nm, loosen again and tighten again with the same torque.
When tightening the screw make sure that the air-flow sensor plate is in its zero position (in the cylindrical part of the air funnel).

It must no longer be possible to turn the air-flow sensor plate by hand.

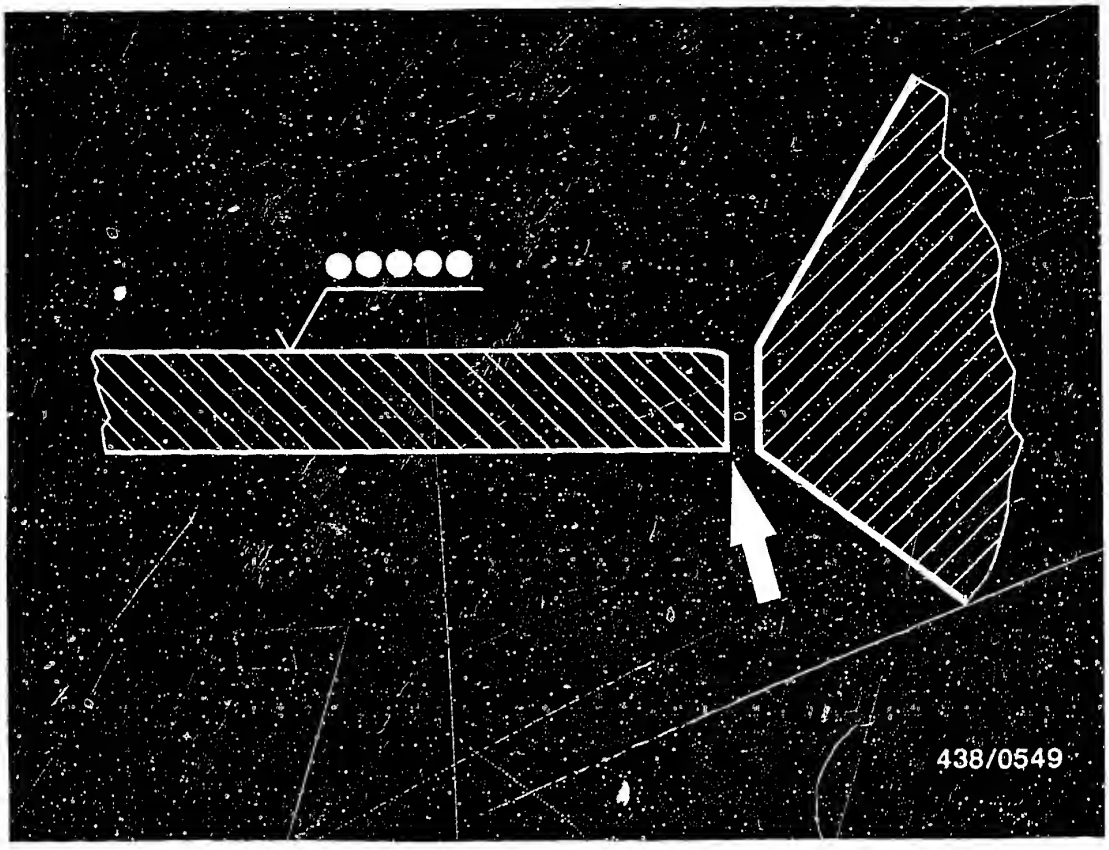


10.3 Checking and adjusting the zero position of the sensor plate (rest position):

Switch on the electric fuel pump for approx. 10 seconds by bridging the safety circuit.
This results in application of the control pressure to the control plunger in the fuel distributor.

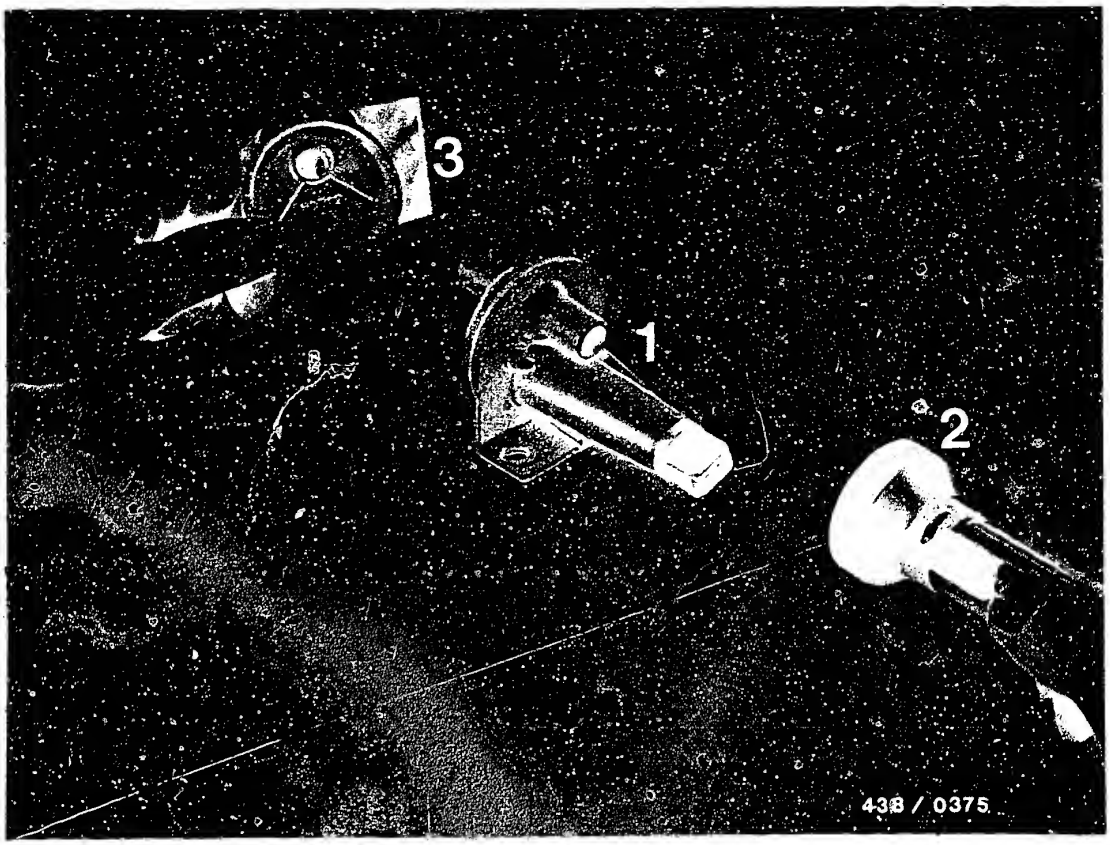
The upper edge of the sensor plate must be flush with the cone in the position marked with a circle in the picture. A lower position of up to maximum 0.5 mm is permissible, however the air-flow sensor plate must not project at any point on its circumference outside the cylindrical part of the air funnel.

If necessary, the position of the leaf-spring limit-stop can be corrected by adjusting the shaped spring (arrow).



Caution:

Be sure that sensor plate is mounted in correct position! Its upper side is identified by five punch marks (in a row). The sharp edge (arrow) is at the bottom.



1 = Auxiliary-air device
2 = Flashlight
3 = Mirror

11. Checking the operation of the auxiliary-air device.

The engine must be cold.
Disconnect the electric cable plugs from the auxiliary-air device and warm-up regulator.
Disconnect both air hoses from the auxiliary-air device.
Since the two hose fittings on the auxiliary-air device are located exactly opposite each other, a visual check can now be made to see if the blocking plate is partially open.
It will be easier to look through the auxiliary-air device with the aid of a flashlight and a mirror, as shown in the illustration.

- If an opening is not visible with the engine cold, replace the auxiliary-air device.

- Fit the electric cable plug on the auxiliary-air device.

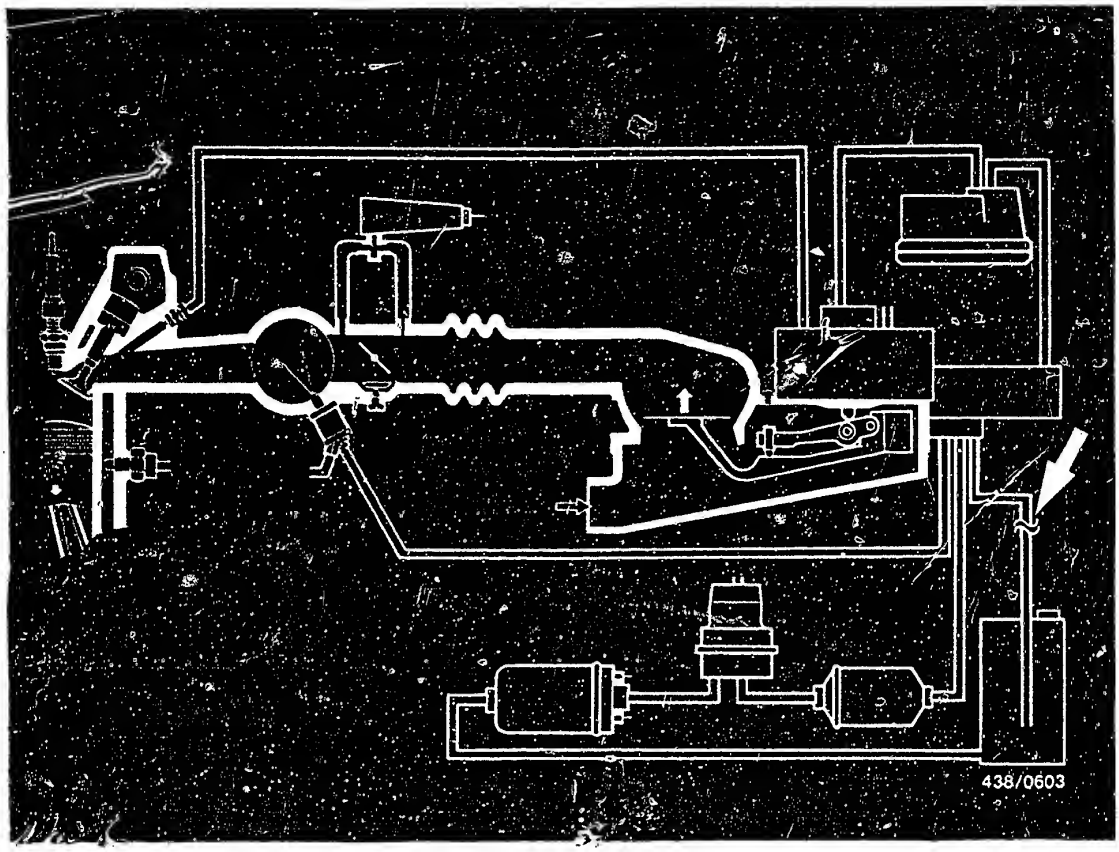
- By bridging the electrical safety circuit, supply power to the auxiliary-air device.
  After a maximum of 10 minutes, the opening in the auxiliary-air device must be completely closed by the blocking plate.

- If the blocking plate does not close, check the power supply (open circuit, voltage drop).
  Minimum voltage across the connector 11.5 V with the engine stopped.

- If these points are O.K., check the heating coil of the auxiliary-air device for an open circuit using an ohmmeter.

- Replace the auxiliary-air device if defective.

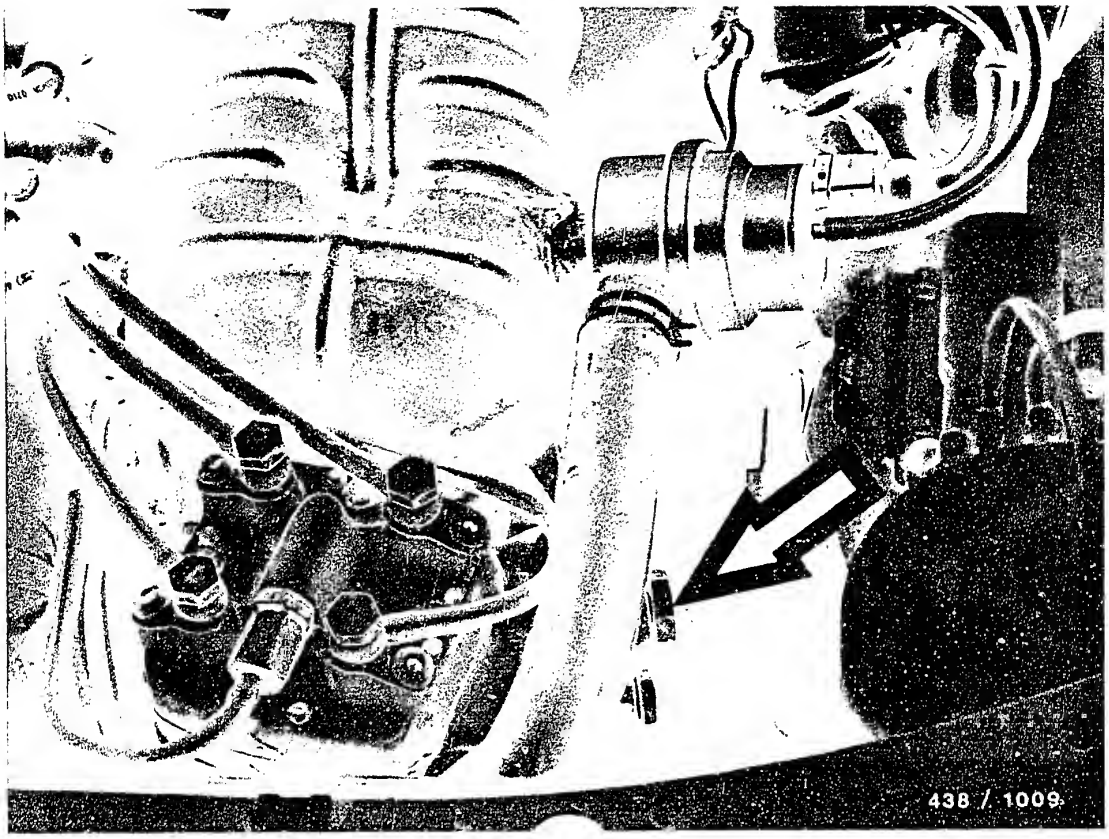
When the auxiliary-air device has been replaced, readjust the idle speed with the engine at normal operating temperature. Idle adjustment is described on Coordinates F 16.



12. Checking the operation of the electric fuel pump.

12.1 Requirement

Conclusive information on the operation of the electric fuel pump can only be given by a measurement of fuel delivery under pressure, i.e. under primary (system) pressure. This measurement must therefore be made at the return line leading to the fuel tank (arrow).



12.2 Measuring point:

A suitable measuring point for fuel-delivery testing is the return port (arrow) on the fuel distributor. Unscrew the fuel return line. Equip a test hose with an inlet union (dia. 12 mm) and connect to the return port of the fuel distributor.

Hold the end of the hose in a graduate (approx. 1.5 litre capacity) in order to make the measurement.

12.3 Checking:

Pull off the plug from the warm-up regulator and auxiliary-air device. Switch on the electric fuel pump for 30 seconds by bridging the safety circuit and collect the fuel delivered in a graduate.

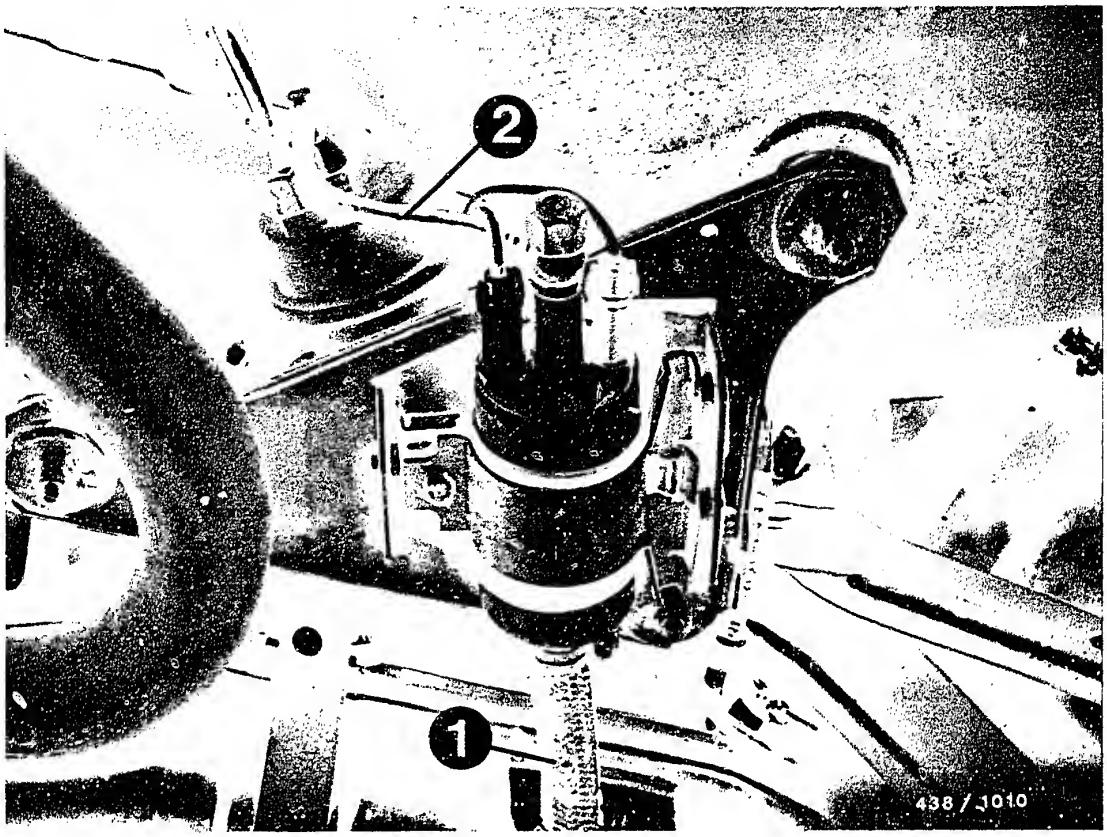
12.4 Test specification:

Fuel delivery: at least 750 cm^3/30 seconds.

12.5 Possible causes of insufficient fuel delivery:

- Power supply to the electric fuel pump defective, voltage drop. Minimum voltage at terminal with pump operating = 11.5 V.
- Fuel filter very dirty.

If these points are O.K., the fault lies in the electric fuel pump itself.
Replace the electric fuel pump.



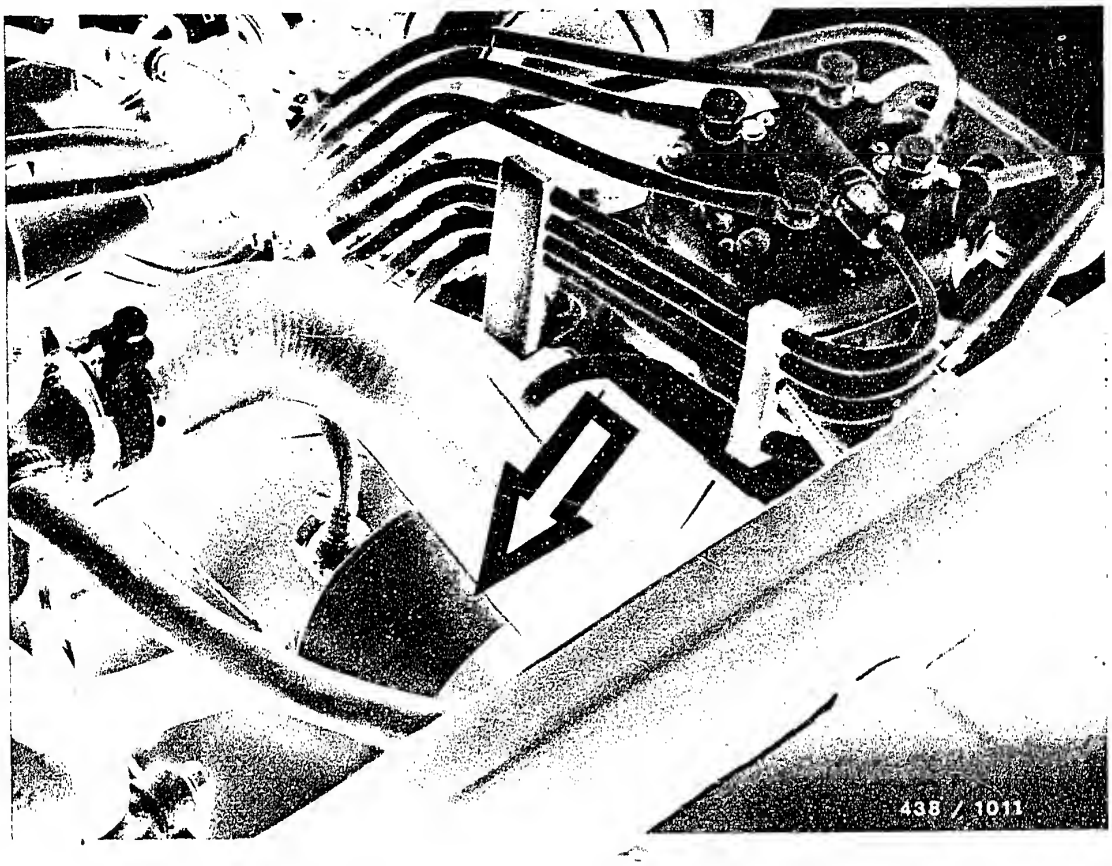
1 = Intake line 2 = Delivery line

12.6 Removing and installing the electric fuel pump

Before removing, pinch off the intake line (e.g. using hose clamper W 157 from Matra Co.) and catch any escaping fuel.

Unscrew the delivery line. Remove electric leads. Loosen the retaining clamp and remove the pump.

Install in the reverse order. Make sure that the damping rubber of the retaining clamp is in the correct position.

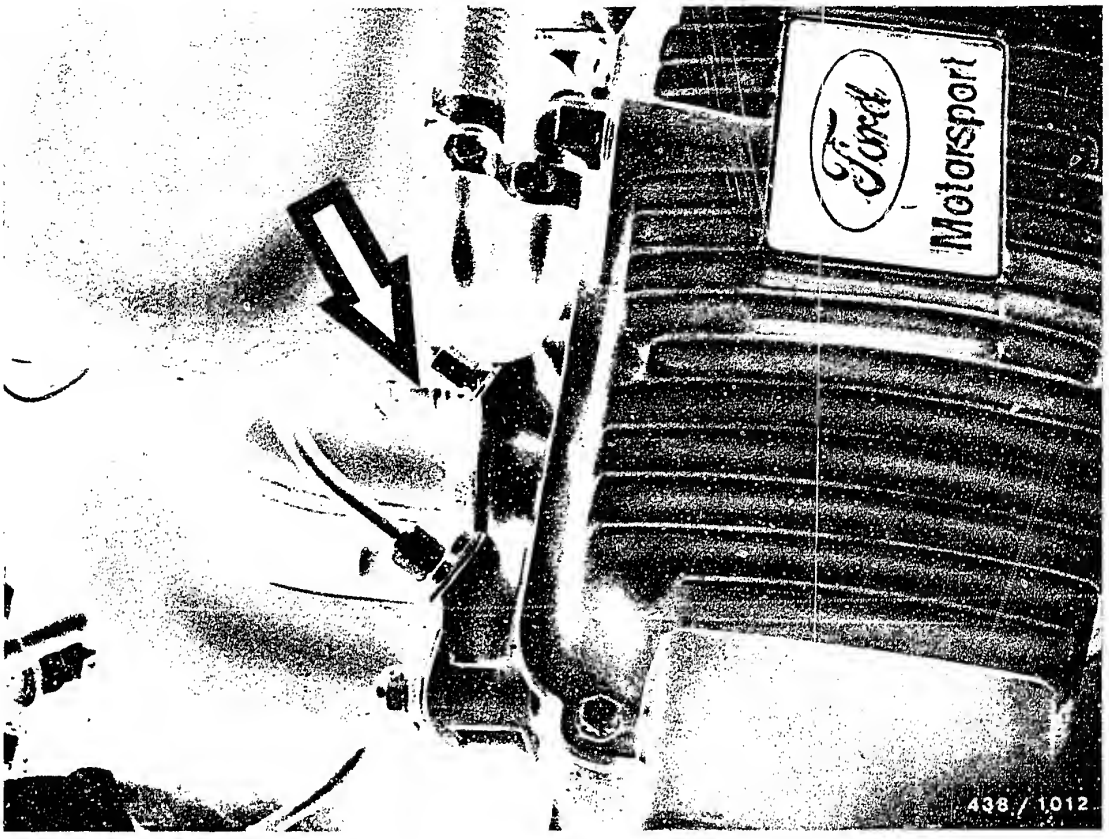


12.7 Removing and installing the fuel filter (arrow):

Unscrew the inlet-union screws of both fuel lines, applying counter-force to the fixed hexagonal section of the fuel filter.

Loosen the fastening clamp and pull out the filter.

When installing, ensure the correct direction of flow and use new seal rings for the inlet-union screws.



13. Testing the cold-start system

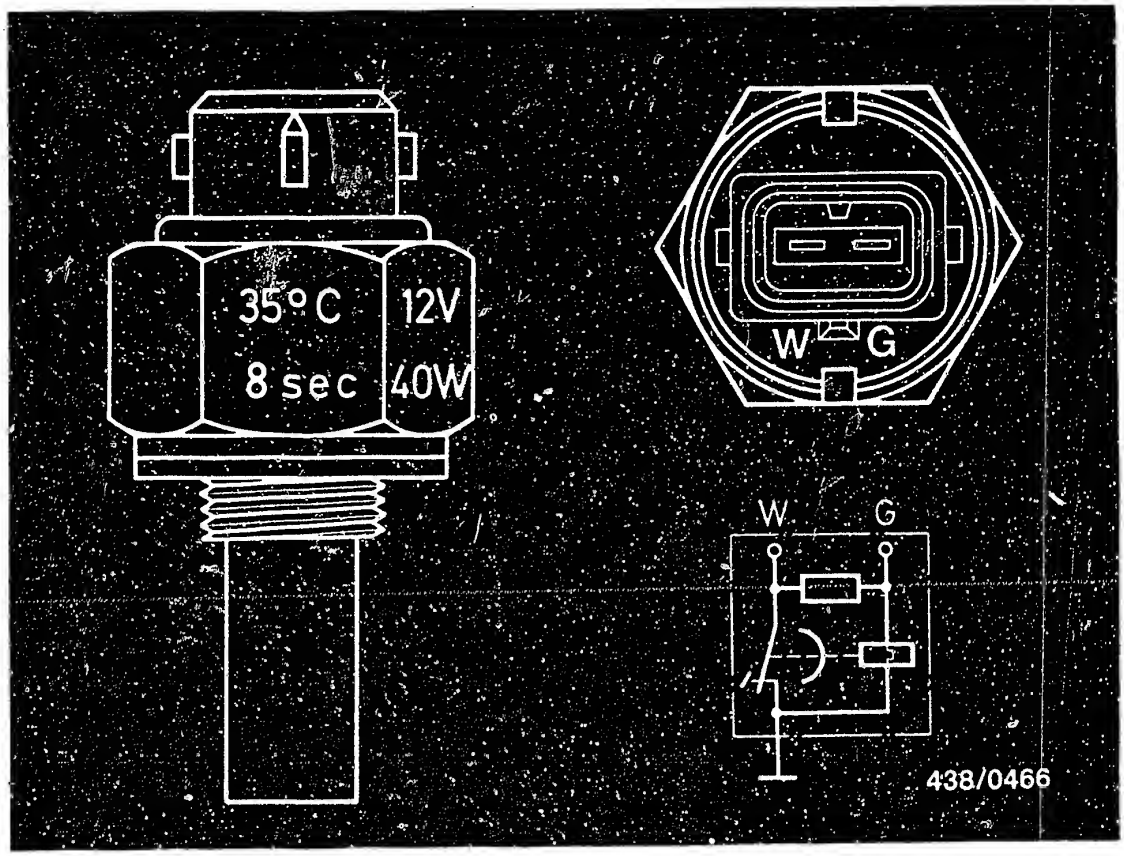
(Thermo-time switch, start valve)

13.1 Thermo-time switch

Remove the thermo-time switch for testing. It is screwed into the cylinder head at the flange of the air-intake port of cylinder 2 (arrow).

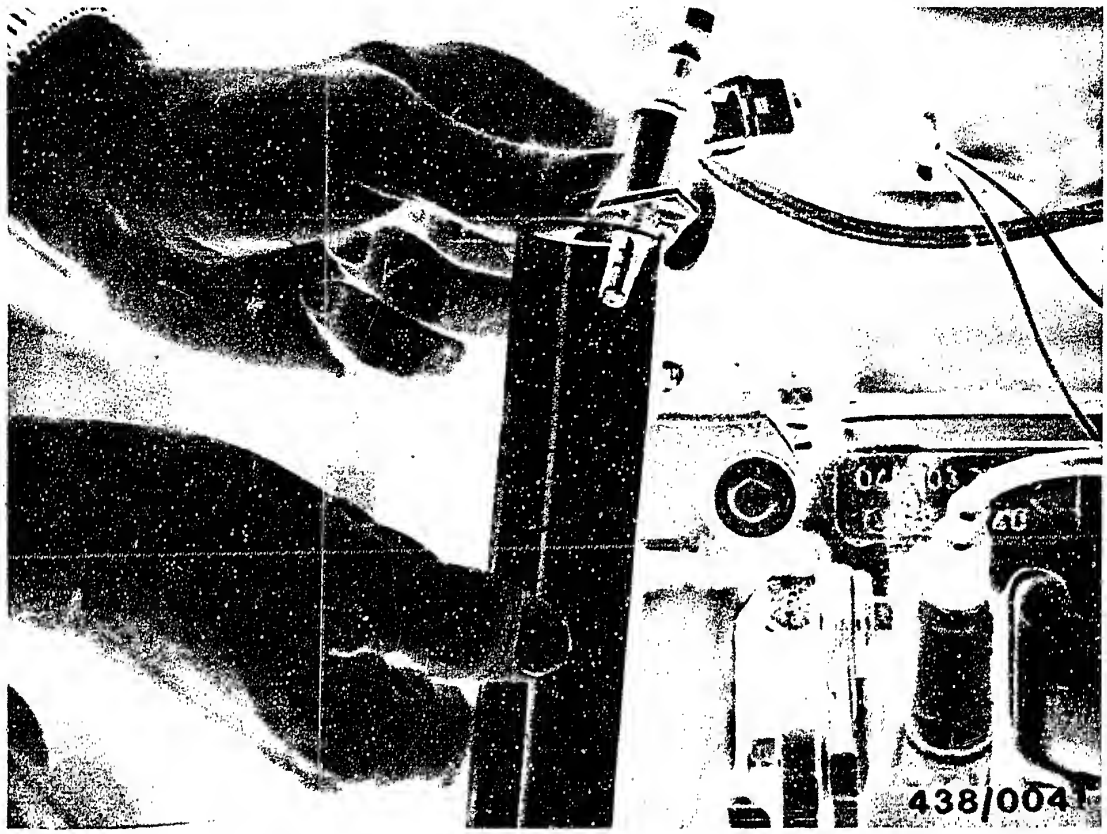
Caution:

If possible, remove only with the engine cold since a slight amount of coolant will escape. The quantity escaping would be considerably greater if the engine were warm.



The switching temperature +35°C and the switching time at -20°C of 8 seconds are stamped into the hexagonal section of the thermo-time switch.
The removed thermo-time switch is tested using the ohmmeter in accordance with the specifications given below. The temperatures for the thermo-time switch can easily be obtained with water. Cooling takes place in a freezer chest.

		Resistance measurement (Ω) between		
At a temperature below °C	above °C	Term."G" and "ground" (housing)	Term. "W" and "ground" (housing)	Term. "G" and term. "W"
+30		25...40	0	25...40
	+40	50...80	100...160	50...80



13.2 Start valve:

Remove the start valve. Hose line remains connected. Pull off the plug and connect the start valve directly to ground and to terminal 15 (e.g. at the ignition coil) using connecting cable KDJE 7450/70.

Important note:
During this test, do not let the connecting cable touch B +. Danger of fire due to sparking!
Hold the start valve in a suitable container (e.g. the graduate).

Switch on the electric fuel pump by bridging the safety circuit.
Switch on the ignition (max. 30 seconds). The start valve must now open and spray fuel.

Switch off the ignition, remove the electric connecting cable and dry the nozzle of the start valve.
The safety circuit remains bridged so that the primary pressure is applied to the start valve.
No droplets of fuel must drip from the nozzle of the start valve during the next minute. Even if shaken and knocked, the start valve must not leak.
Then switch the electric fuel pump off again.
Replace the start valve if it does not open or if it leaks.

If a leaky start valve or a defective thermo-time switch has been replaced, it is necessary finally to adjust the idle speed with the engine at normal operating temperature.
Idle-speed adjustment is described on Coordinates F 16

14. Checking the control pressures

14.1 Preliminary remarks:

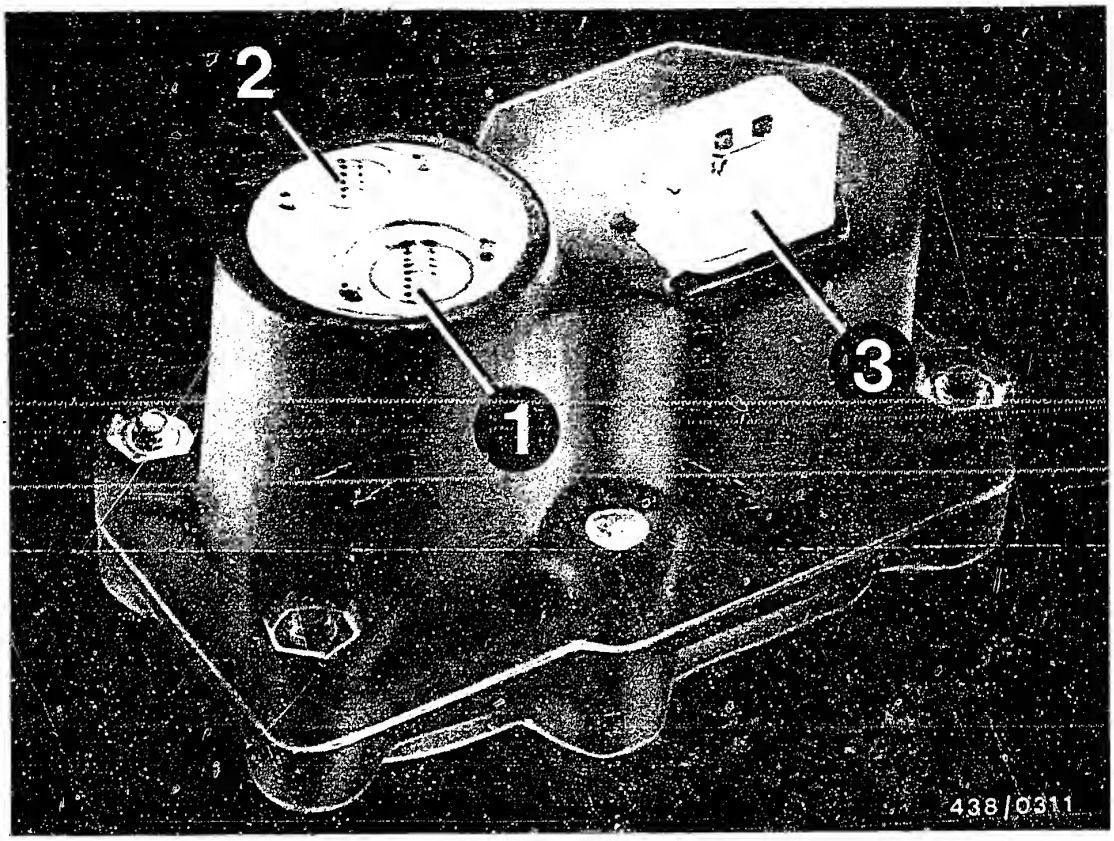
The control pressures tested in the following are in each case governed by the warm-up regulator.
If the test results are incorrect, however, this may also be due to faults which have nothing to do with the warm-up regulator.

These possible faults are:

- No or too low a voltage at the electric connector.
- Fuel return from the warm-up regulator blocked or constricted.
- Too high a fuel delivery for the control-pressure circuit.

The testing of this control-pressure delivery is described as an additional test step at the beginning of the control pressure tests.
Test specification: 160...240 cm^3/min.

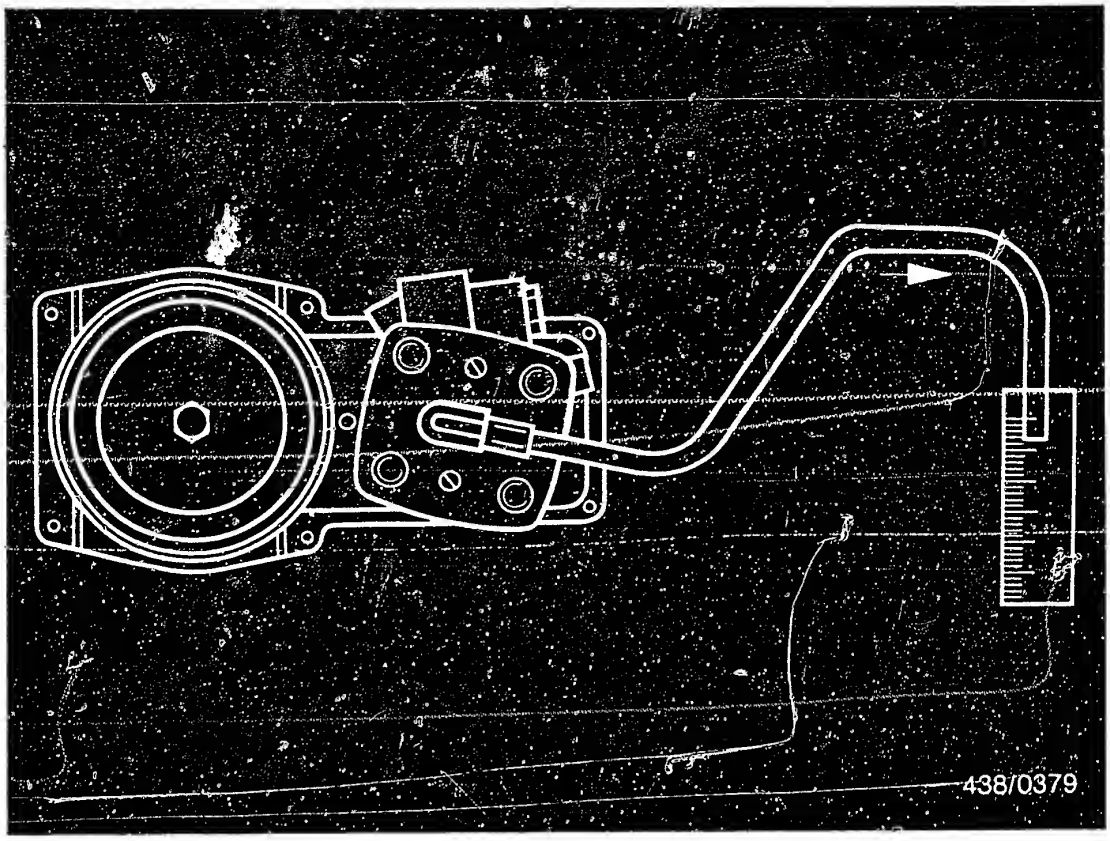
Reference is made to the other possible causes of trouble in the respective test step.



1 = Intake port (M 10 x 1)
2 = Return port (M 8 x 1)
3 = Electrical connection

14.2 Design of warm-up regulator

The warm-up regulator corresponds to the standard design, i.e. apart from control pressure "cold" and "warm" no other functions (such as full-load and altitude compensation) are performed.

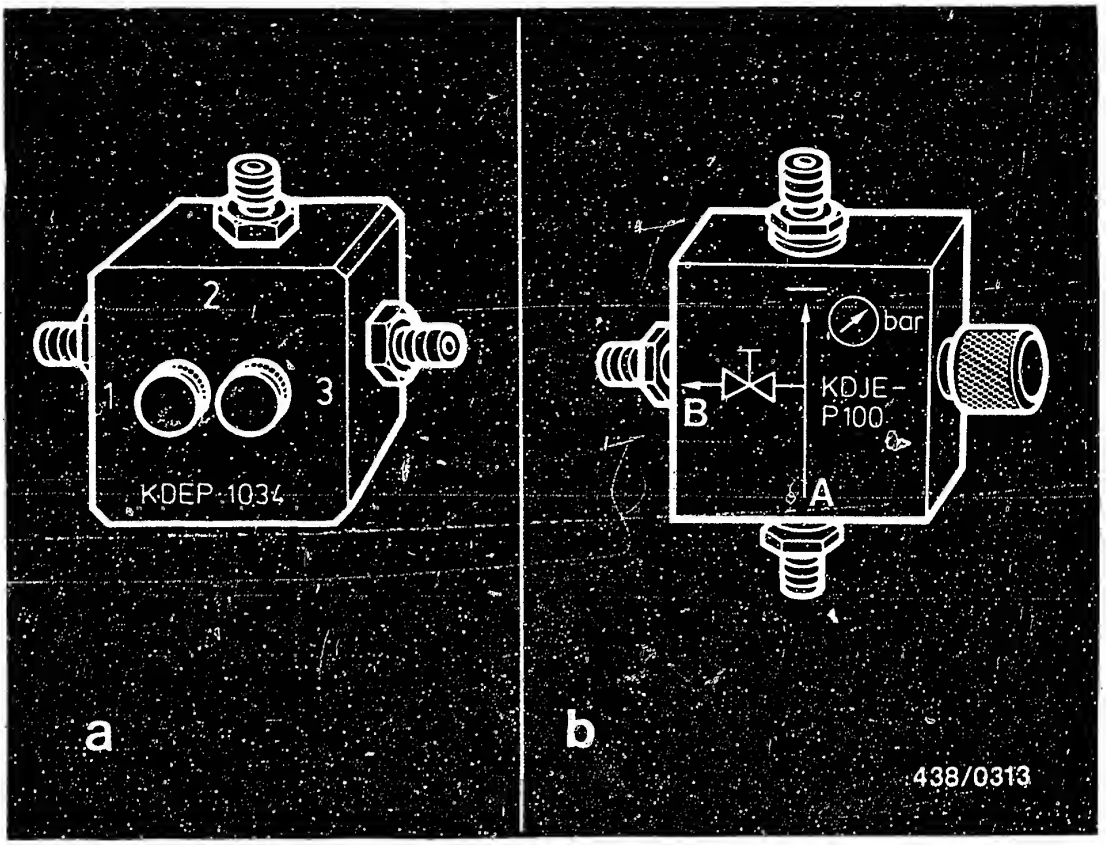


14.3 Checking the fuel delivery for the control-pressure circuit:

Before testing, make sure that the electric fuel pump is operating properly.
Test specification: 750 cm^3/30 s

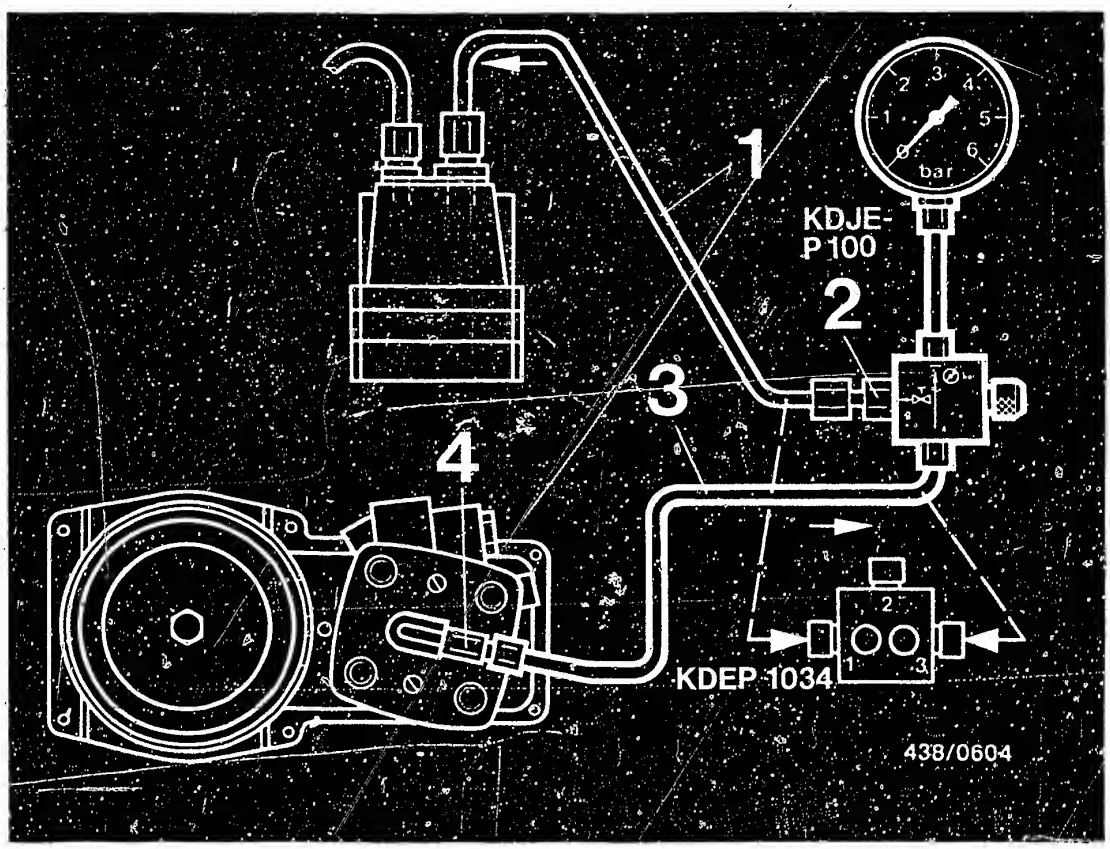
Unscrew the control-pressure line (to the warm-up regulator) from the fuel distributor.

Connect one of the two connecting hoses of the pressure tester KDJE-P 100 (previously KDEP 1034) to the control-pressure port of the fuel distributor (thread M 12 x 1.5) and hold hose in graduate (approx. 0.5 litre capacity).



14.4 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a). Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b). The connections of this directional-control valve are identified by symbols:
A = Inlet (from the fuel distributor)
B = Outlet (to the warm-up regulator)
Caution:
When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.

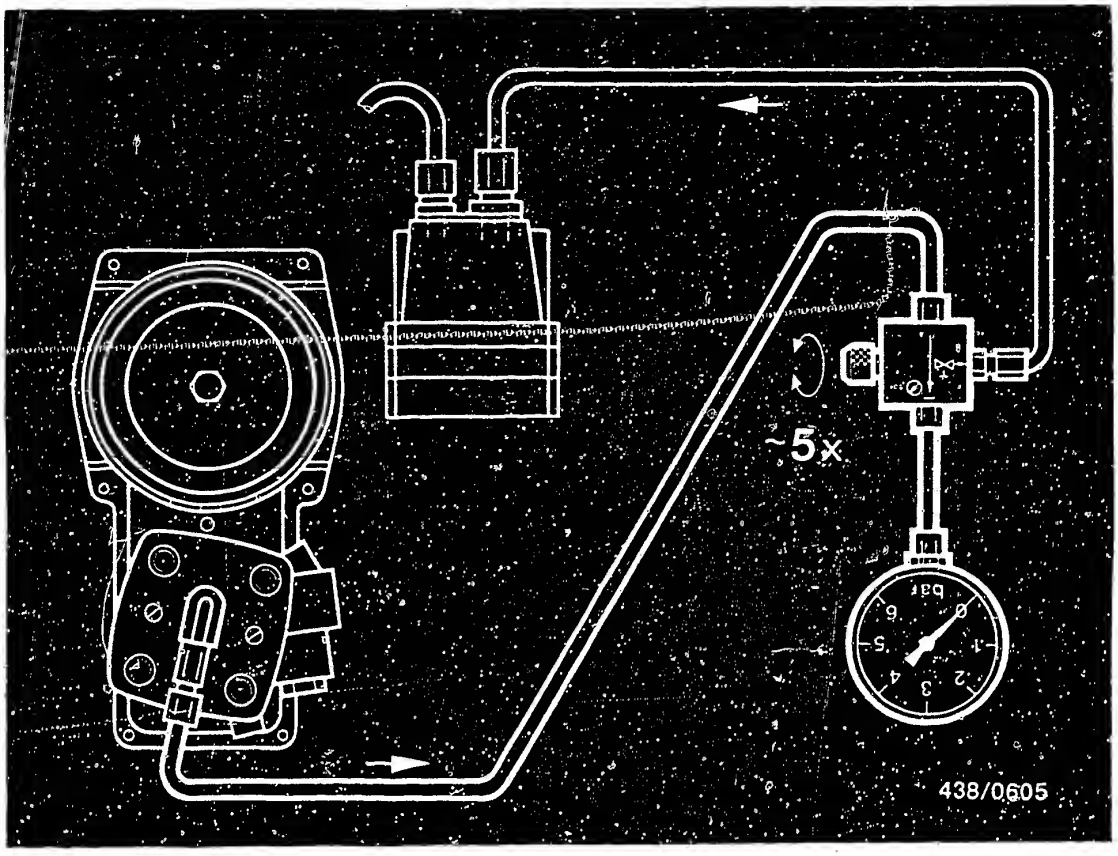


The directional-control valve of the pressure tester is connected into the control-pressure line from the fuel distributor to the warm-up regulator.

Unscrew the control-pressure line (1) on the fuel distributor and connect to outlet fitting B or 1 (2) of the directional-control valve.

Connect the hose line (3) of the pressure tester to the control-pressure connection port (4) of the fuel distributor.

Suspend the pressure gauge from the engine-compartment lid (possibly using a wire hook).



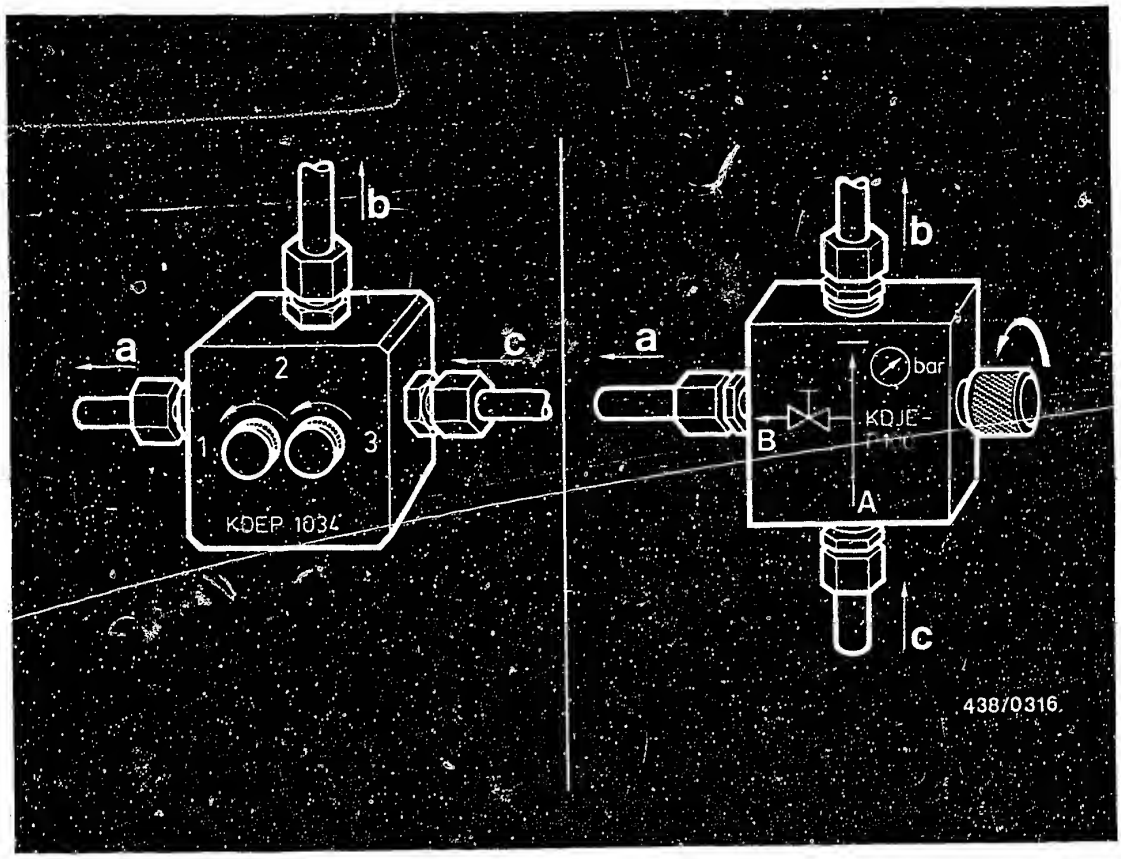
14.5 Bleeding the pressure tester

Disconnect the electric plug from the warm-up regulator and the auxiliary-air device. Let the pressure gauge hang down (hose fully extended).

Switch on the electric fuel pump by bridging the electrical safety circuit.

Open and close the valve screw of the directional-control valve in a 10-second rhythm about 5 times.

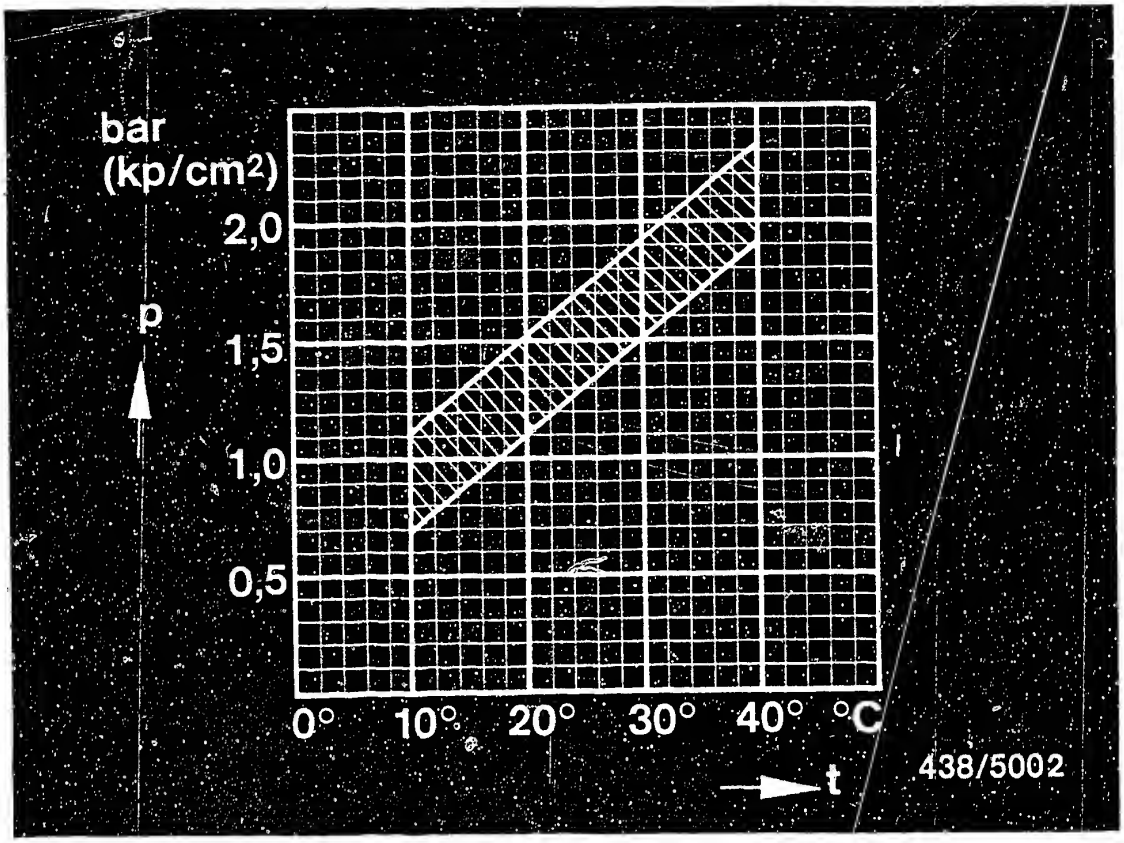
Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood). Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

14.6 Testing the "cold" control pressure:

The test is performed with the engine switched off.
The engine must be cold. For this purpose, the engine should have been switched off for several hours, preferably overnight.
Pull off the plug from the warm-up regulator.
Open the valve screw of the directional-control valve (both screws in the case of KDEP 1034).
Switch on the electric fuel pump by bridging the electrical safety circuit.

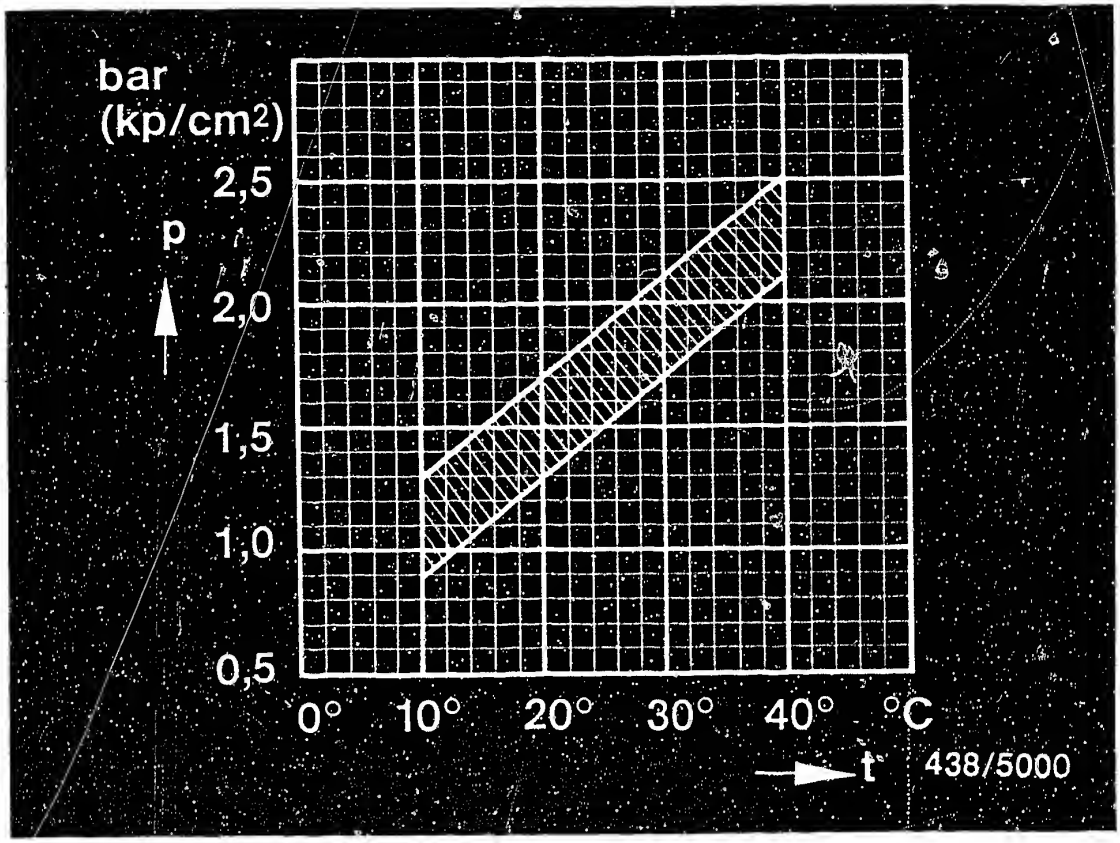


p = Control pressure (bar or kgf/cm² gauge pressure)
t = Ambient temperature (°C)

Warm-up regulator Part No.: 0 438 140 073
(Escort XR 3i)

Calculate the nominal control pressure in accordance with the ambient temperatures in the graph.

Example: Ambient temperature = 20°C
Nominal control pressure = 1.1...1.5 bar gauge pressure



p = Control pressure (bar or kgf/cm² gauge pressure)
t = Ambient temperature (°C)
Warm-up regulator Part No: 0 438 140 011
(Escort RS 1600i)

Calculate the nominal control pressure in accordance with the ambient temperatures in the graph.

Example: Ambient temperature = 20°C
Nominal control pressure = 1.3...1.7 bar gauge pressure

If the measured "cold" control pressure differs from the set value, the following faults are possible:

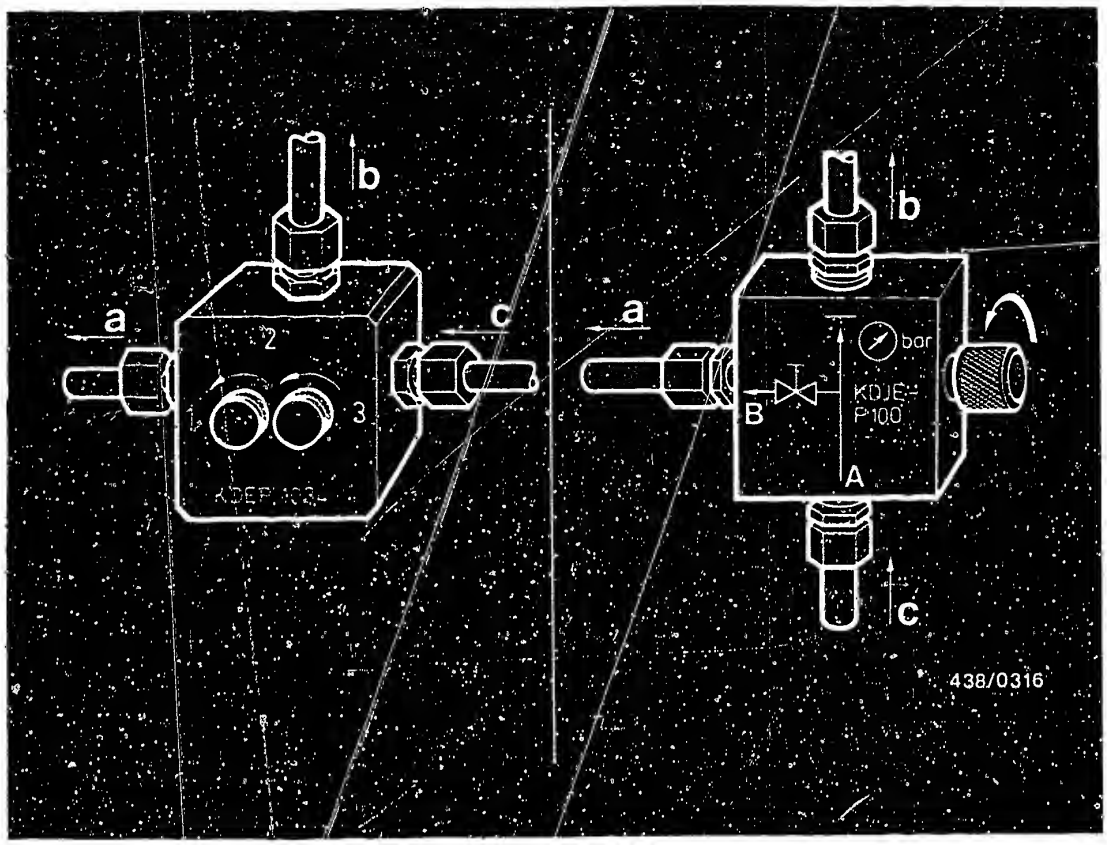
- Fuel delivery for control-pressure circuit too low or too high.
  Test the fuel delivery.
  Test specification: 160...240 cm^3/min.

- Fuel return from warm-up regulator blocked or constricted (if control pressure too high).
  Eliminate constriction.

- Warm-up regulator defective. Replace warm-up regulator.

When the warm-up regulator has been replaced or a fault remedied, carry out the idle adjustment with the engine at normal operating temperature.

Idle adjustment is described on Coordinate F 16.



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

Warm-up regulator Part No.: 0 438 140 004

The test is performed with the engine switched off. The temperature of the engine is not important.

Open the valve screw of the directional-control valve (both screws in the case of KDEP 1034).

Switch on the electric fuel pump by bridging the electrical safety circuit.

Attach the plug to the warm-up regulator.

Control pressure now rises (the warm-up regulator in the process of shutting off) until the "warm" control pressure is reached.
The "warm" control pressure is indicated on the pressure gauge of the pressure tester.

Warm-up regulator: 0 438 140 011
0 438 140 073

Test specification for "warm" control pressure: 3.4...3.8 bar gauge pressure (3.5...3.9 kgf/cm² gauge pressure)

If the measured "warm" control pressure differs from the test specification, this may be due to one of the following faults:

If control pressure too high:

- Fuel pressure for the control-pressure circuit too high.
  Test fuel delivery.
  Test specification: 160...240 cm³/min.
- Fuel return from the warm-up regulator blocked or constricted. Eliminate constriction.
- Warm-up regulator has hydraulic defect.
  Replace warm-up regulator.

If control pressure too low

- Power supply open circuit.
  Eliminate open circuit. Ensure that proper contact is being made at the plug.

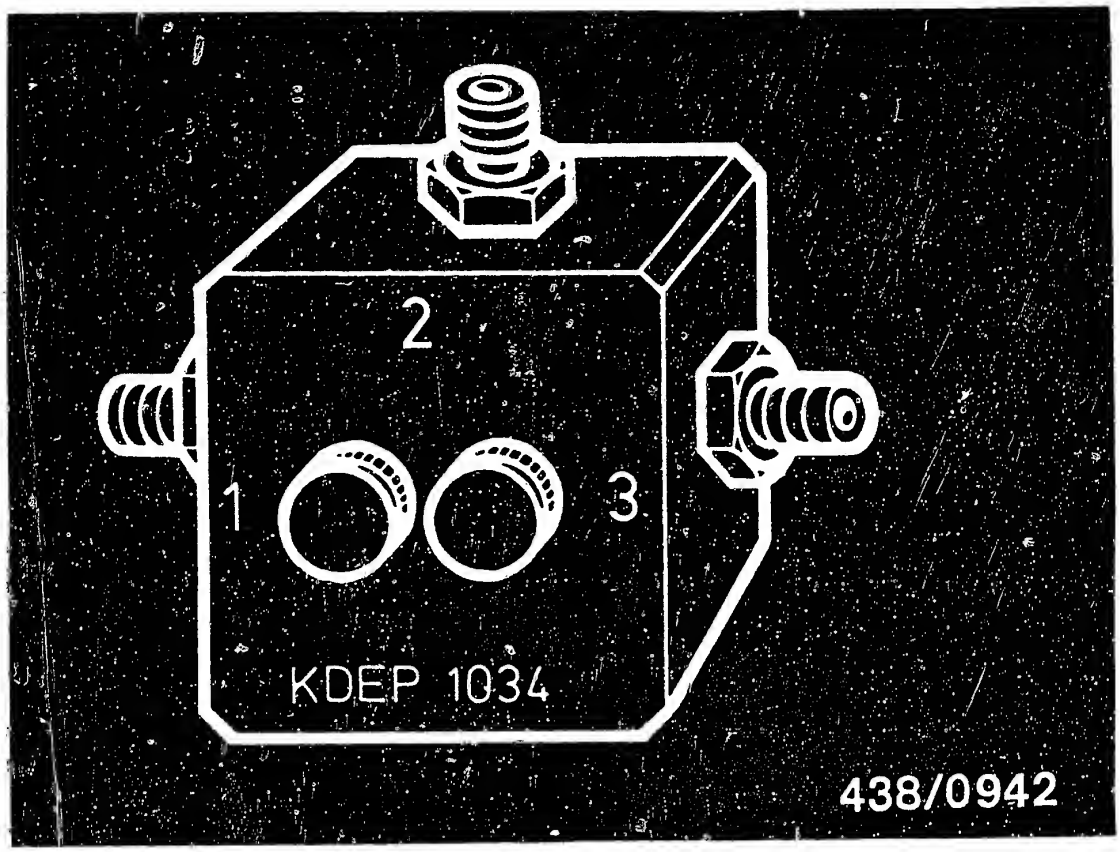
- Battery voltage too low, voltage drop.
  Eliminate voltage drop. Minimum voltage at connector: 11.5 V
  Possibly repeat the test with the engine running in order to obtain the alternator voltage of approx. 14 V normal during driving.

- Fuel delivery for control-pressure circuit too low.
  Test the fuel delivery.
  Test specification: 160...240 cm^3/min.

- Warm-up regulator defective. Open circuit in heating coil. Hydraulically defective. Replace warm-up regulator.

When the warm-up regulator has been replaced or a fault remedied, carry out the idle adjustment with the engine at normal operating temperature.

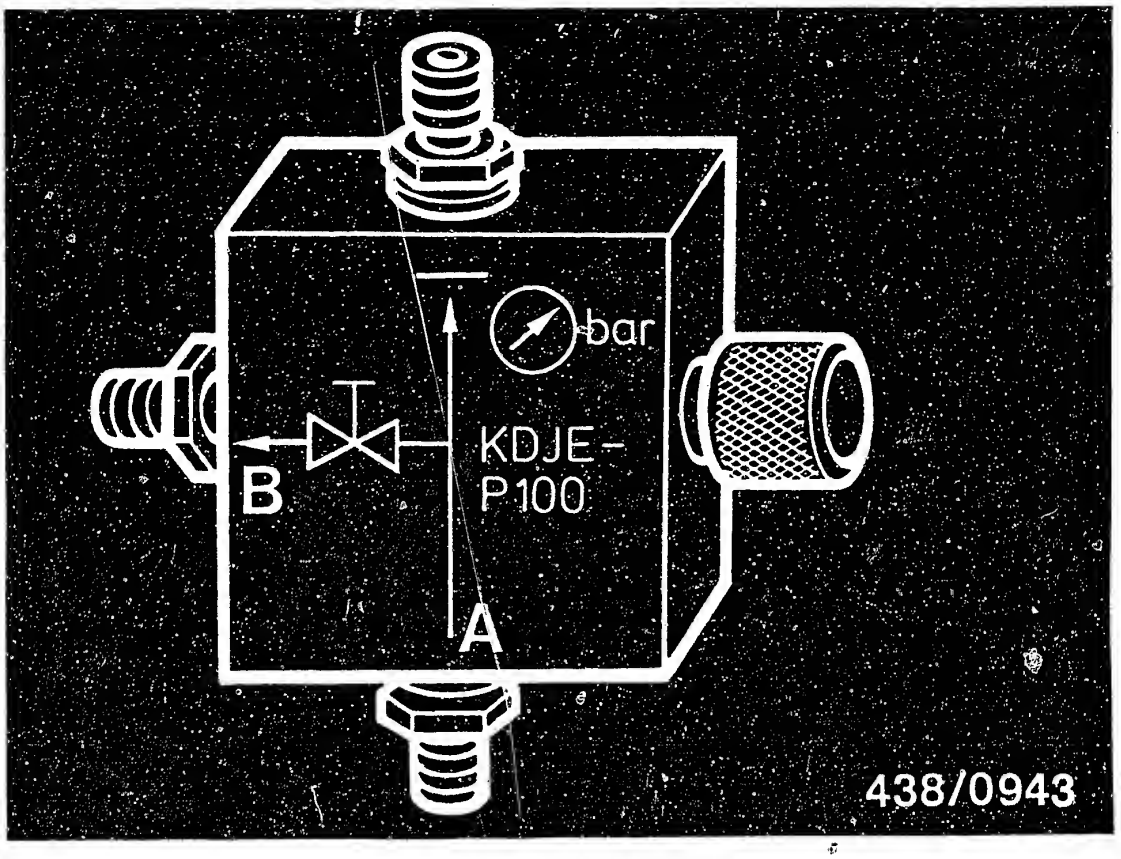
Idle adjustment is described on Coordinate F 16.



15. Testing and adjusting the primary (system) pressure:

15.1 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

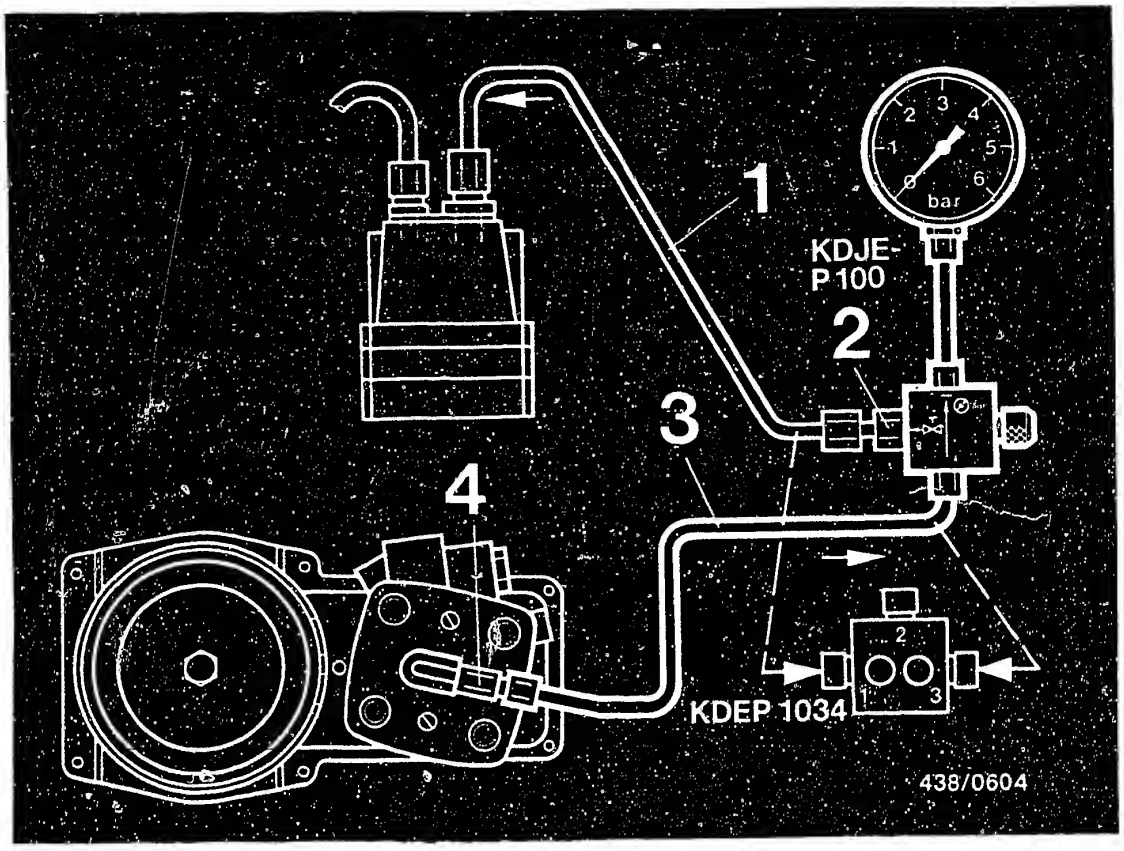
The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered



Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw. The connections of thisdirectional-control valve are identified by symbols:

A = Inlet (from the fuel distributor)
B = Outlet (to the warm-up regulator)

Caution:
When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.

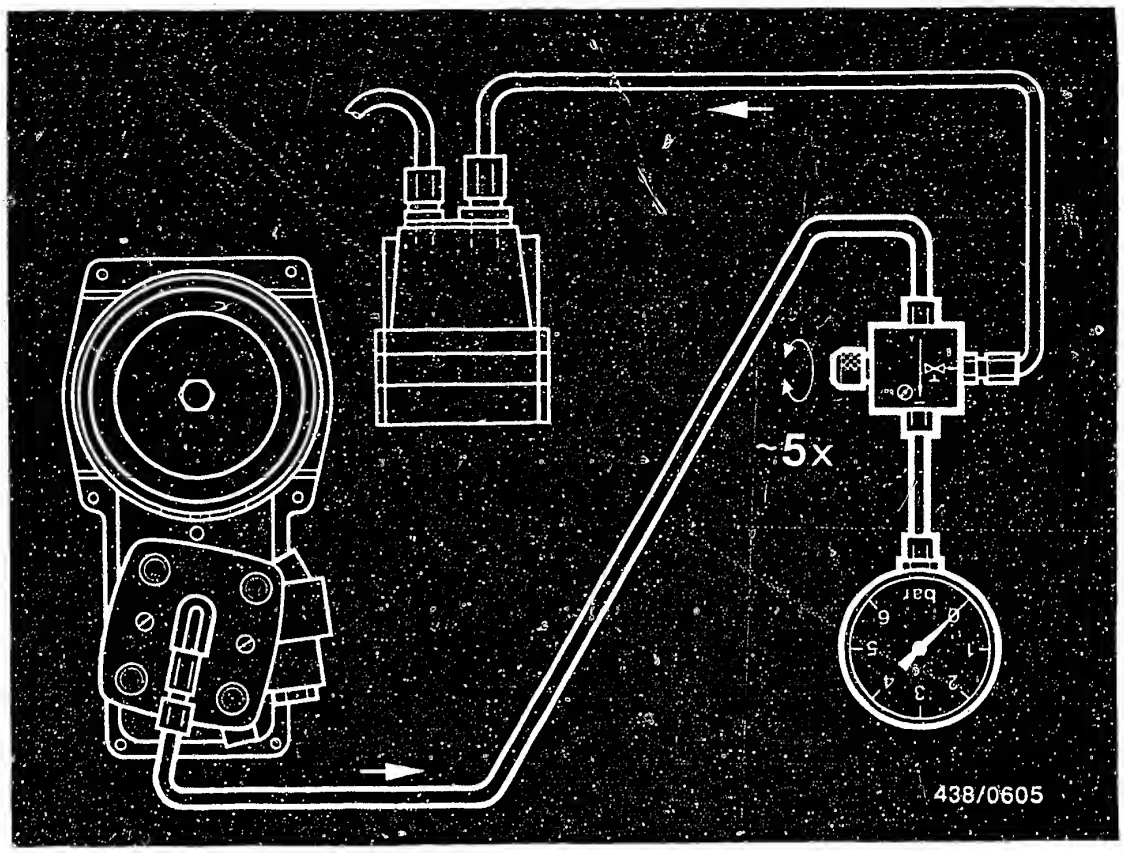


The directional-control valve of the pressure tester is connected into the control-pressure line from the fuel distributor to the warm-up regulator.

Unscrew the control-pressure line (1) on the fuel distributor and connect to outlet fitting B or 1 (2) of the directional-control valve.

Connect the hose line (3) of the pressure tester to the control-pressure connection port (4) of the fuel distributor.

Suspend the pressure gauge from the engine-compartment lid (possibly using a wire hook).



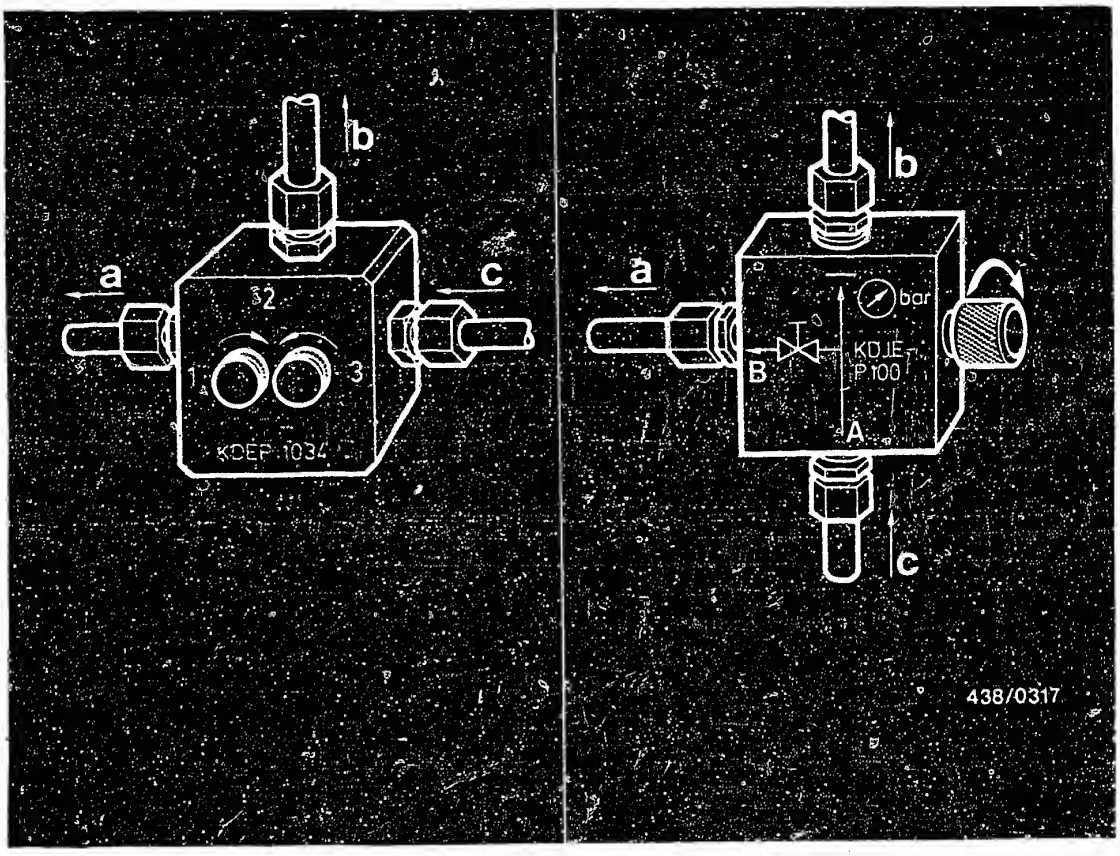
15.2 Bleeding the pressure tester

Disconnect the electric plug from the warm-up regulator and the auxiliary-air device. Let the pressure gauge hang down (hose fully extended).

Switch on the electrical fuel pump by bridging the electrical safety circuit.

Open and close the valve screw(s) of the directional-control valve in a 10-second rhythm about 5 times.

Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood). Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

15.3 Testing the primary pressure:

The test is performed with the engine switched off. The temperature of the engine is not important.

Close the valve screw of directional-control valve KDJE-P 100. In the case of KDEP 1034, close valve screw 1, open valve screw 3.

Fuel distributor Part No.	Test specifications - primary pressure (gauge pressure)
0 438 100 121	4,7...5,4 bar (4,8...5,5 kgf/cm²)

Possible causes for too low a primary pressure:

- Fuel supply faulty
(Delivery of electric fuel pump too low).

- Primary pressure set incorrectly.

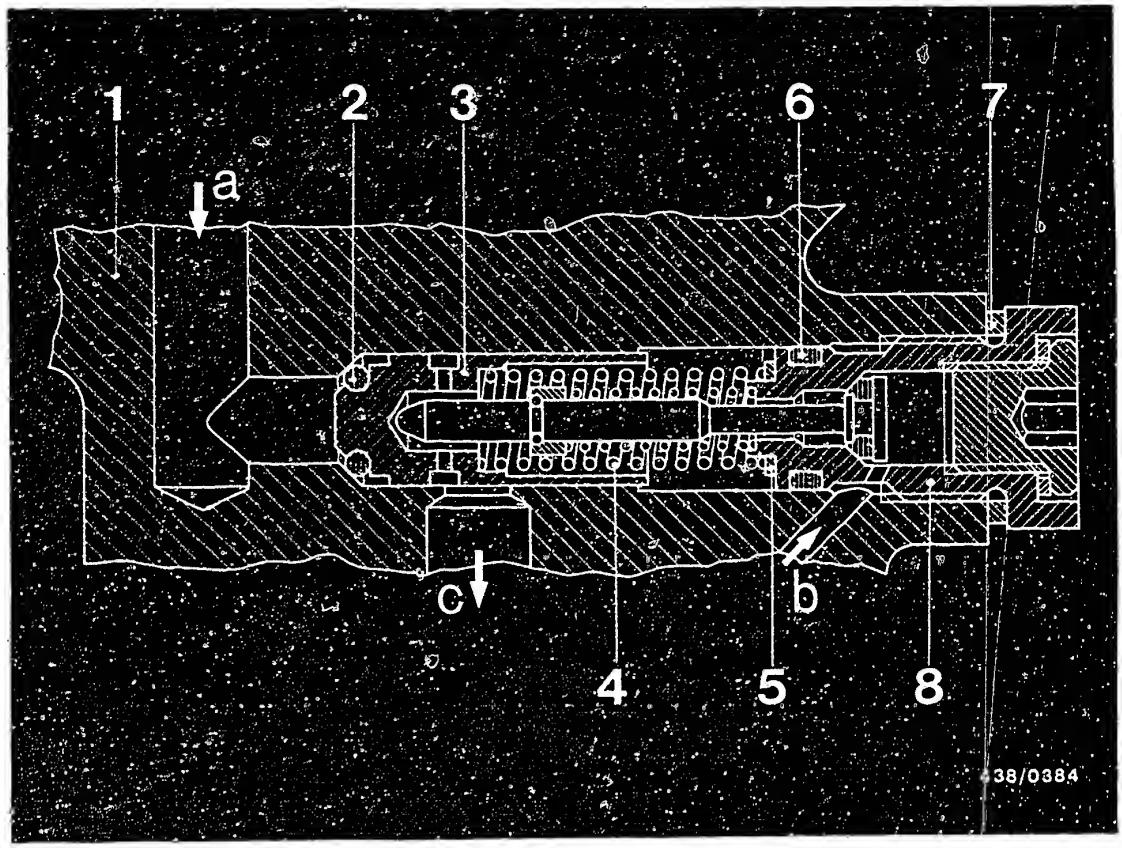
A precondition for readjustment of the primary pressure is always that the fuel supply is in order.
Measure the fuel delivery. (Test specification: 750 cm³ / 30 s.

Possible causes for too high a primary pressure:

- A restriction in the return line leading to the fuel tank.

- Primary-pressure regulator set incorrectly.

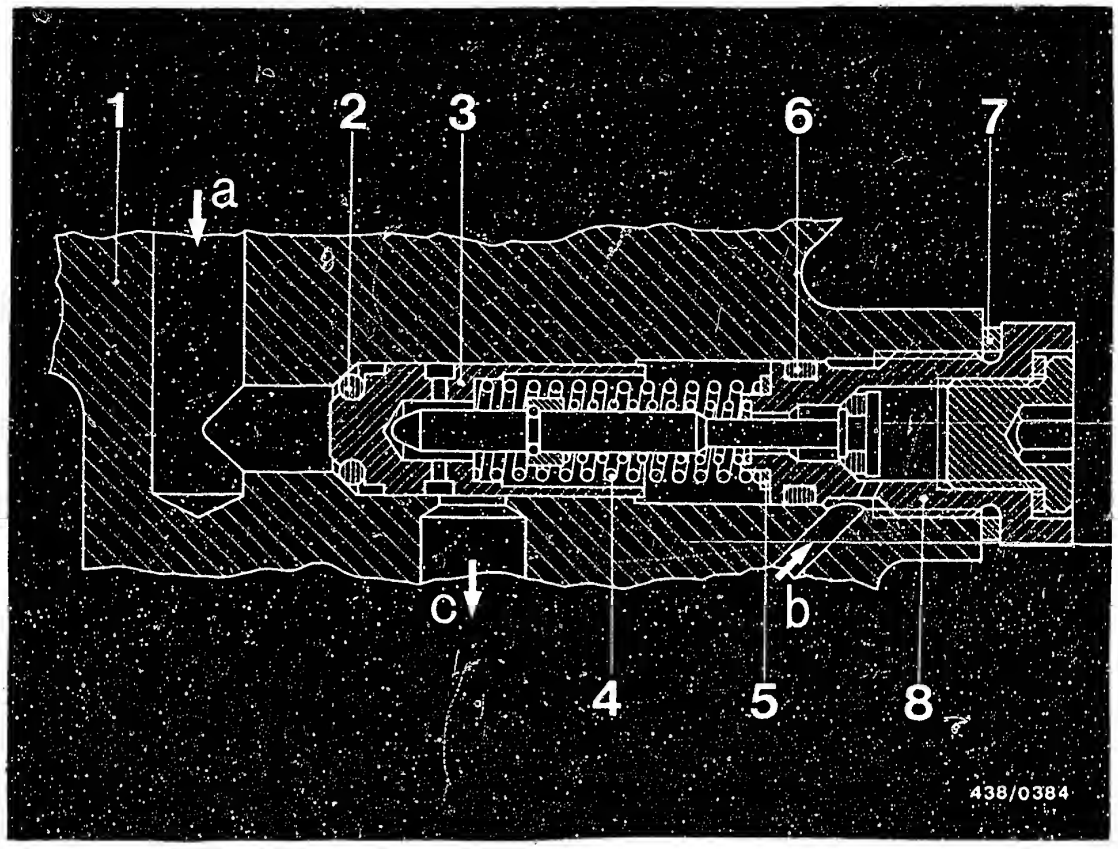
For this reason, before readjusting too high a primary pressure, always first check the condition of the return line leading to the fuel tank.



a = Primary pressure
b = From warm-up regulator
c = Fuel return
1 = Fuel-distributor housing
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
6 = O-ring
7 = Flat seal ring
8 = Screw plug

15.4 Adjusting the primary pressure:
Primary-pressure adjustment values:

Fuel distributor Part No.	Adjustment values - Primary pressure
0 438 100 121	4,9...5,1 bar (5,0...5,2 kgf/cm²)

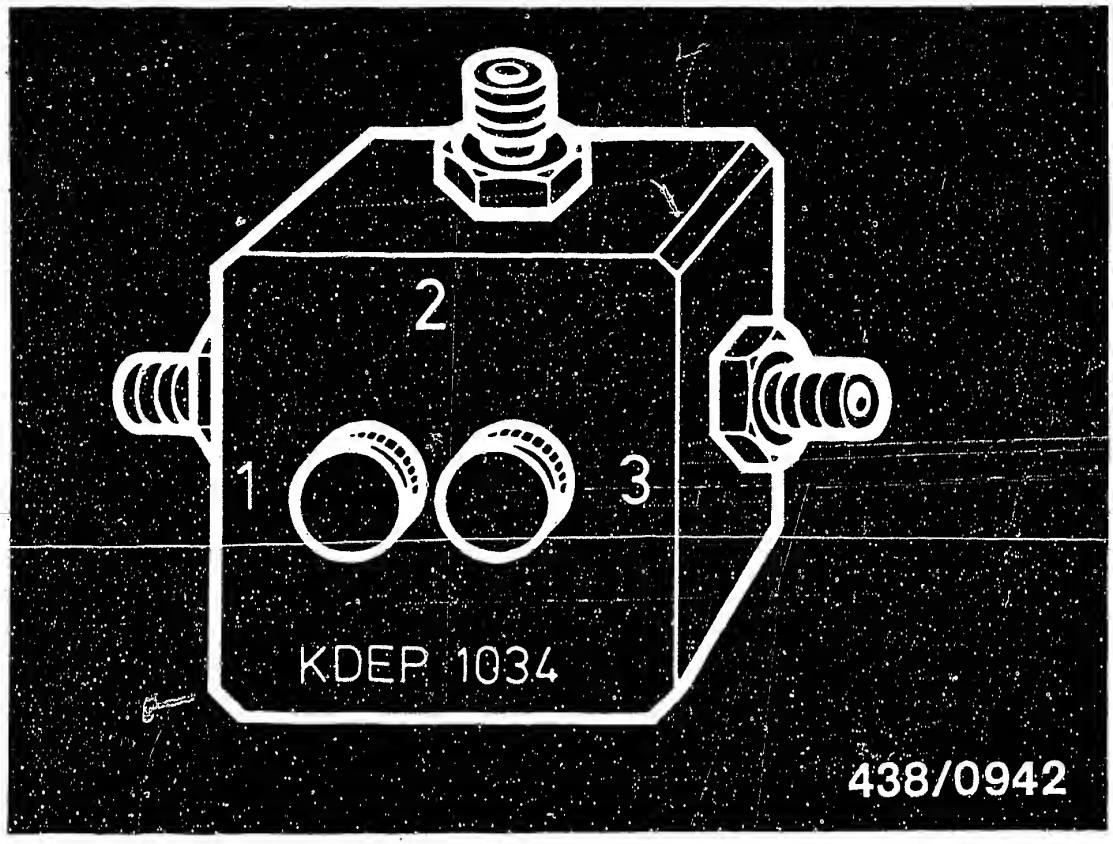


The primary pressure is readjusted by replacing the shims (Item 5).

Note:
0.1 mm more of shim thickness means about 0.15 bar pressure increase and vice versa.

To do this, screw out the large screw plug (Item 8) together with the push valve. After carrying out the adjustment, always fit the screw plug with a new flat seal ring (Item 7) and O-ring (Item 6).

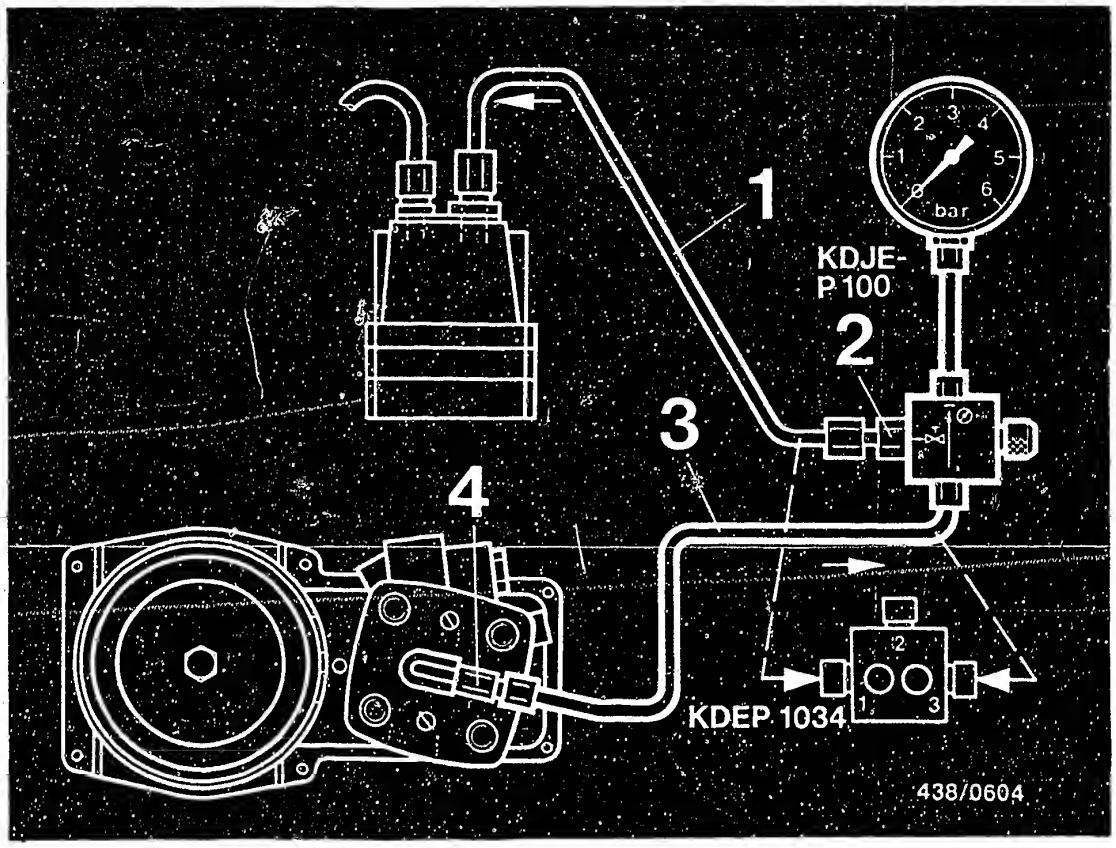
The control piston (Item 3) of the primary-pressure regulator must not be lost. It was matched specially to the fuel distributor housing in the manufacturing plant and therefore is the only part of the primary-pressure regulator which must not be replaced.



16. Testing the entire fuel system for leaks.

16.1 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered .

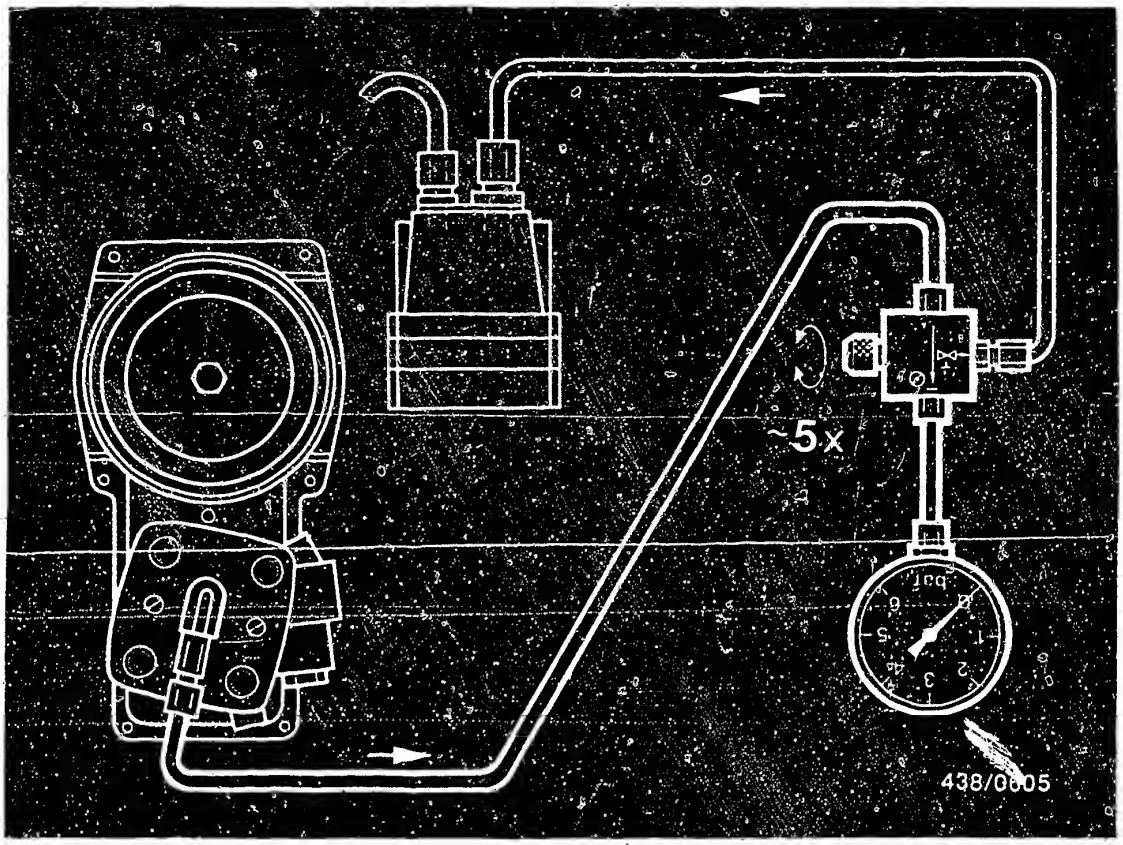


The directional-control valve of the pressure tester is connected into the control-pressure line from the fuel distributor to the warm-up regulator.

Unscrew the control-pressure line (1) on the fuel distributor and connect to outlet fitting B or 1 (2) of the directional-control valve.

Connect the hose line (3) of the pressure tester to the control-pressure connection port (4) of the fuel distributor.

Suspend the pressure gauge from the engine-compartment lid (possibly using a wire hook).



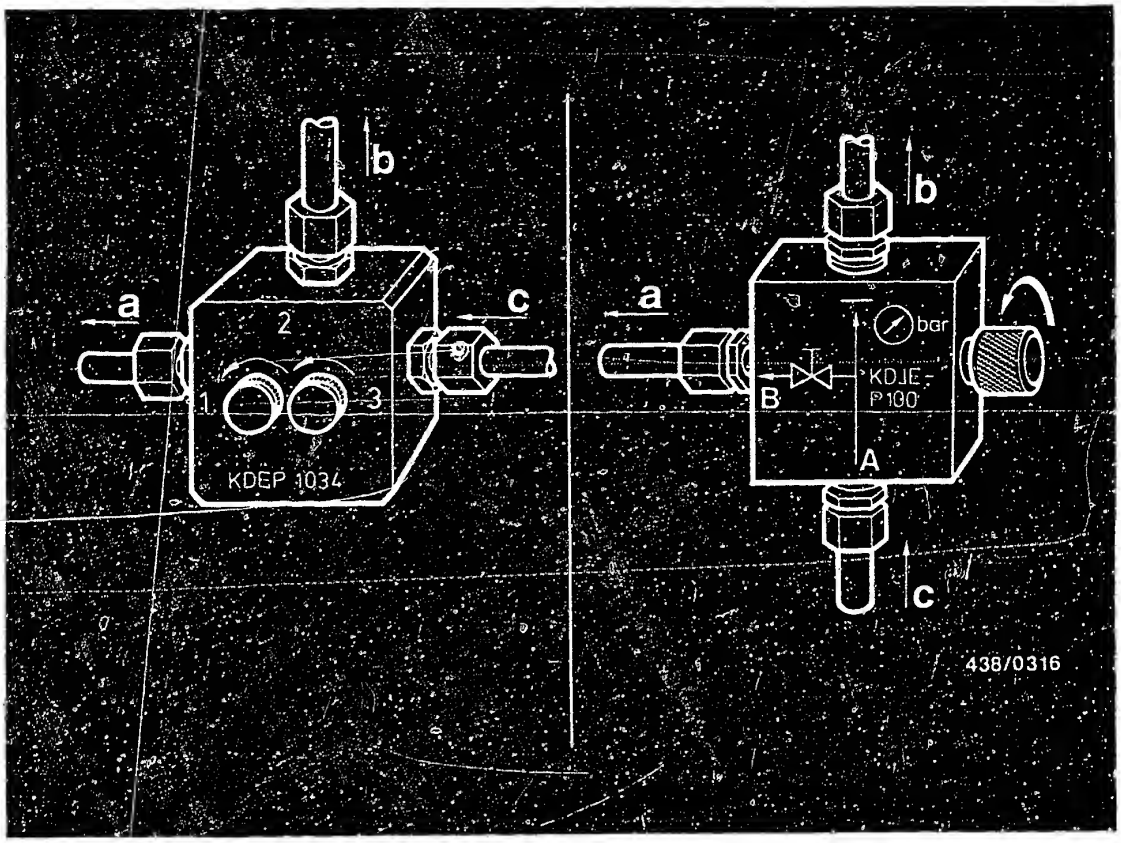
16.2 Bleeding the pressure tester

Disconnect the electric plug from the warm-up regulator. Let the pressure gauge hang down (hose fully extended).

Switch on the electric fuel pump by bridging the electrical safety circuit.

Open and close the valve screw(s) of the directional-control valve in a 10-second rhythm about 5 times.

Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood). Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

16.3 Leak test

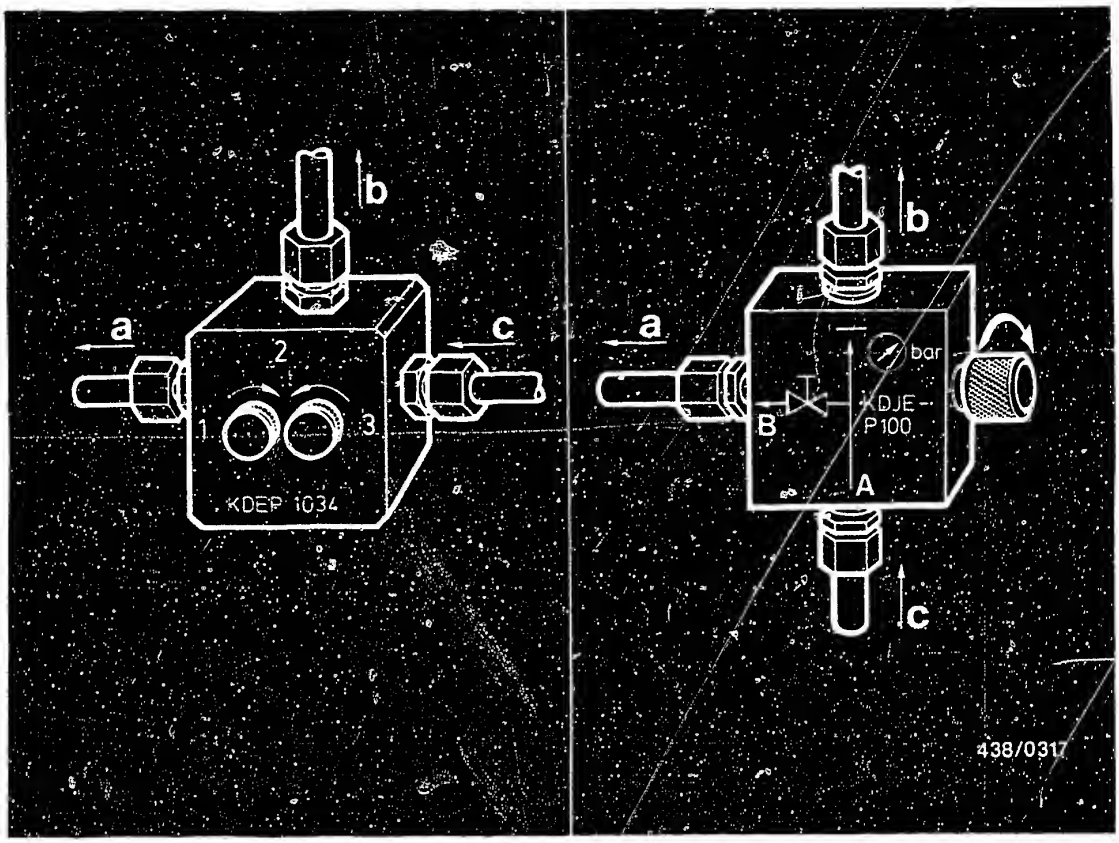
The test is performed with the engine switched off. Make the test with a warm engine but not immediately after the engine has been operated at a high temperature.
Open the valve screw of the directional-control valve (both valves in the case of KDEP 1034).

Switch on the electric fuel pump by bridging the electrical safety circuit until the warm-up regulator has ceased to operate ("warm" control pressure).

Switch the electric fuel pump off again and observe the drop in pressure on the pressure gauge.

Test specifications for leak test:

Minimum pressure (gauge pressure)
after 10 minutes: 2,7 bar (2,8 kgf/cm²
after 20 minutes: 2,6 bar (2,7 kgf/cm²

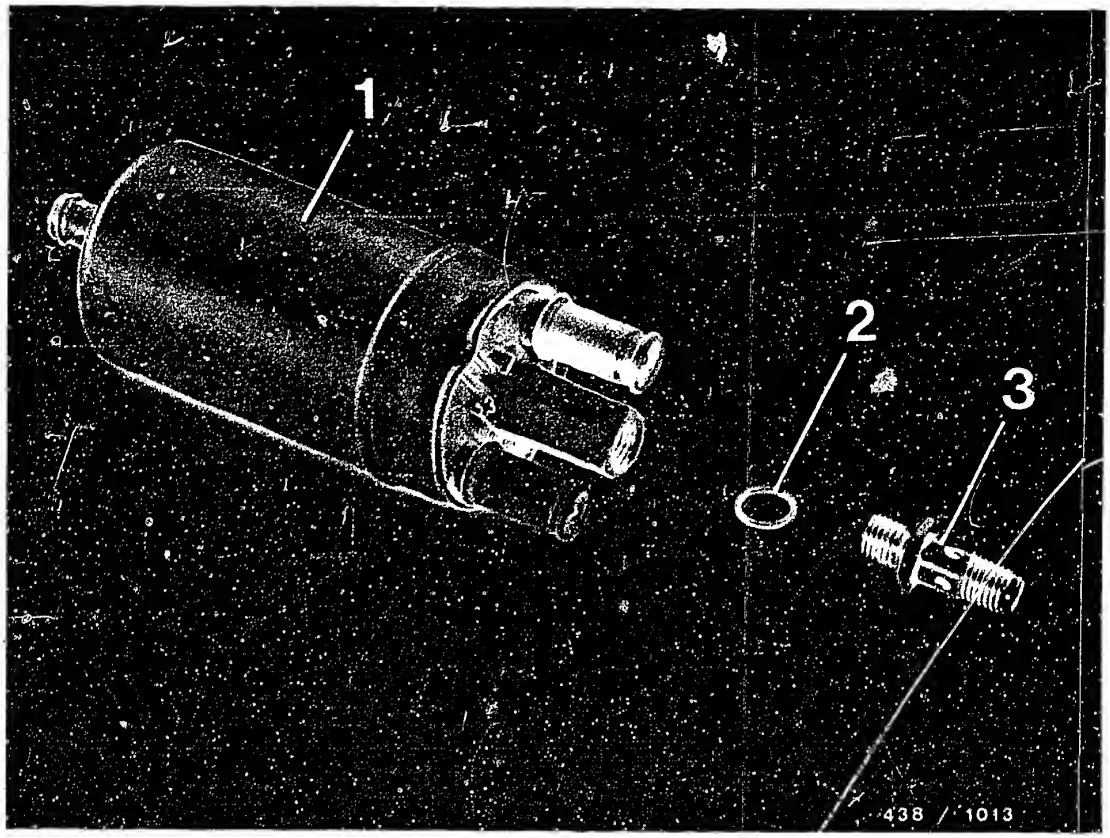


a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

If the pressure drops too quickly, repeat the test with the control-pressure circuit disconnected.

Position of the valve screws:
Close the valve screw of the directional-control valve KDJE-P 100.
In the case of KDEP 1034, close valve screw 1, open valve screw 2.

If the same result is found, the leak is in the primary-pressure circuit.
If the test results are correct during the second test, the leak is in the control-pressure circuit.



1 = Electric fuel pump
2 = Flat seal ring
3 = Tube fitting

16.4 Possible causes of a defect in the primary-pressure circuit:

- Non-return valve in the pressure connection piece of the electric fuel pump has a leak.

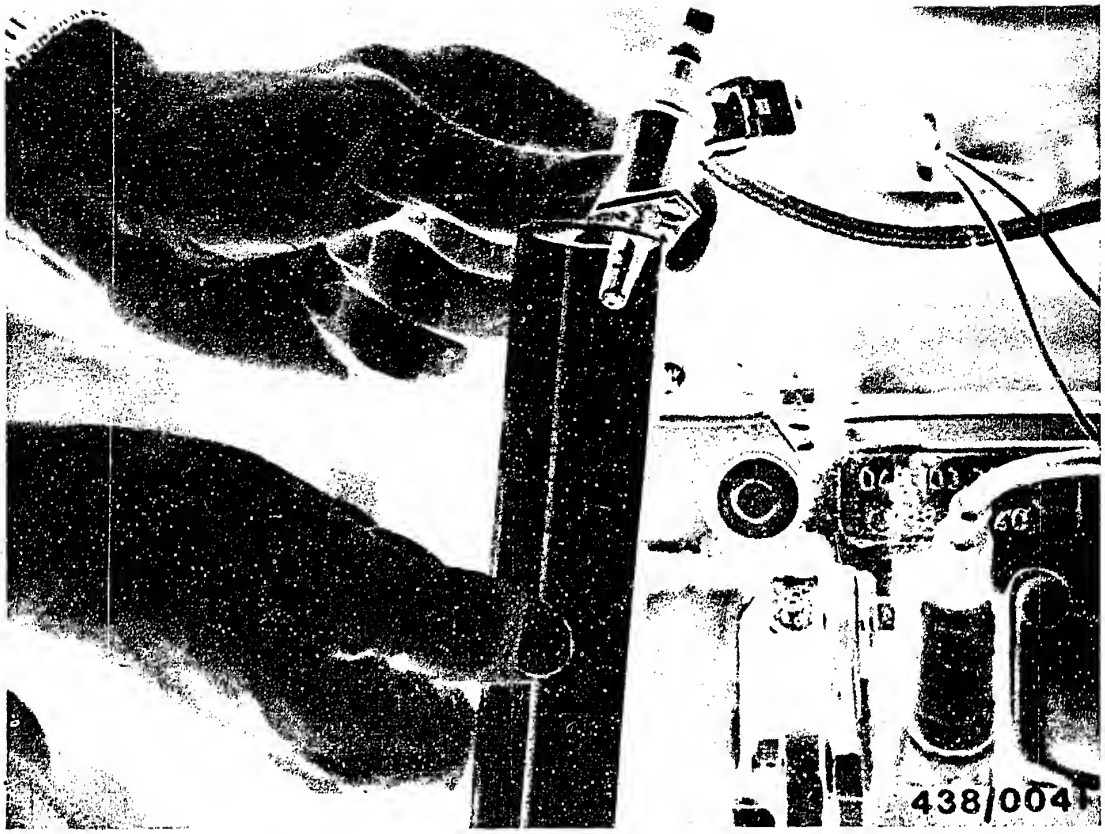
Part No. of electric fuel pump: 0 580 254 952

The non-return valve is built into the tube fitting. If necessary, replace the tube fitting Part No.: 1 583 386 016 as follows:

Thoroughly clean the connection of the delivery line on the electric fuel pump.
Pinch off the intake hose (fuel tank - electric fuel pump) (e.g. using hose clamper W 157 from Matra Co.).
Screw off the delivery line, collecting any escaping fuel.
Screw out the defective tube fitting.

Screw a new tube fitting (short end) with thick flat seal ring into the pressure connection piece and tighten to a torque of 17...25 Nm while at the same time applying a wrench to the hexagonal section of the pressure connection piece. Fit a thin flat seal ring, fuel-line inlet union and another flat seal ring onto the long end of the tube fitting and tighten with the hexagon cap nut.
Remove hose clamper from intake hose.

Check connections for leaks with the electric fuel pump in operation.



Further possible cause of leaks in the primary-pressure circuit:

- Start valve leaking.

Remove the plug from the start valve and remove the start valve. The fuel line remains connected.

Hold the start valve in a suitable vessel (e.g. a graduate).

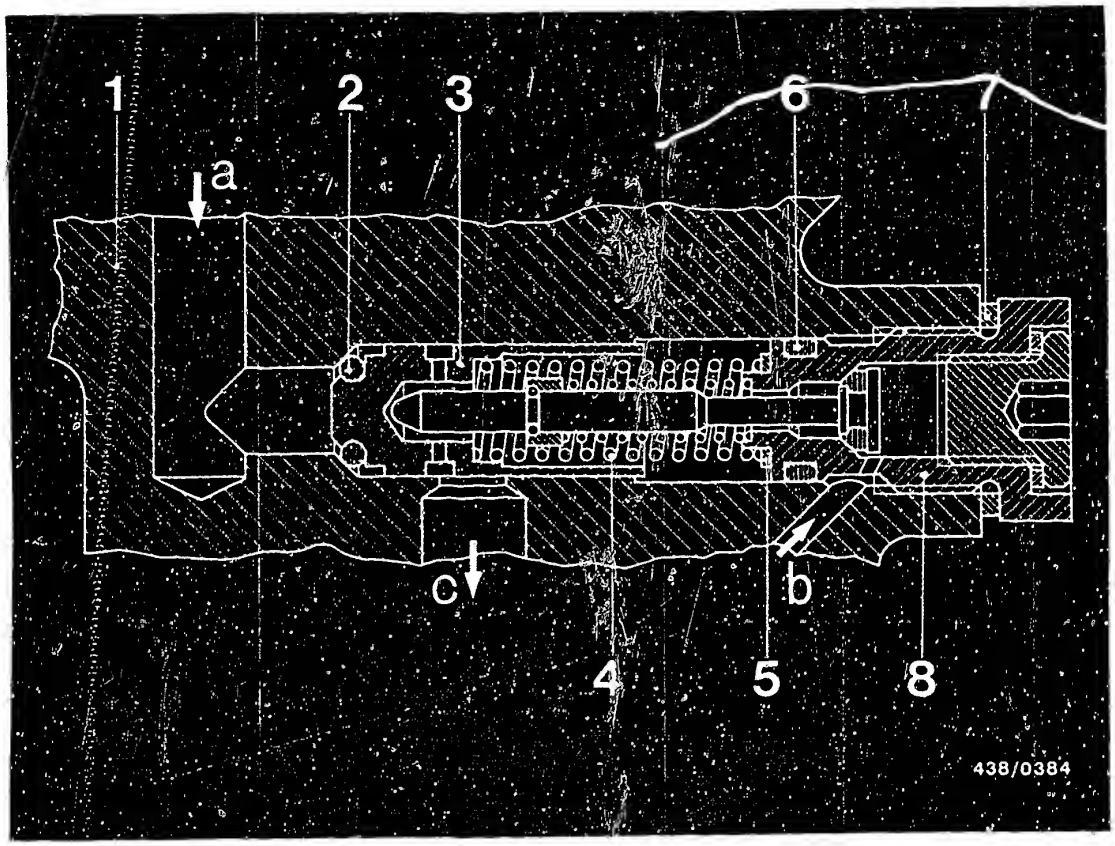
Switch on the electric fuel pump by bridging the electrical safety circuit so that primary pressure is applied to the start valve.

Dry off the nozzle of the cold-start valve.

No drops must fall from the nozzle of the start valve within the next minute. Even when shaken and knocked, the start valve must not leak.

Switch the electric fuel pump off again.

Replace the cold-start valve if leaky.
Finally, adjust idle speed with the engine at operating temperature.
Idle-speed adjustment is described on Coordinates F 16.



a = Primary pressure
b = From warm-up regulator
c = Fuel return
1 = Fuel-distributor housing
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
6 = O-ring
7 = Flat seal ring
8 = Screw plug

Further possible cause of leaks in the primary-pressure circuit:

- Seal ring (O-ring) on control piston of primary-pressure regulator has a leak.

Replace the seal ring.
Clean the fuel distributor in the region of the primary-pressure regulator.

Unscrew the large screw plug (8) with the complete push-up valve. Also remove the shims (5), control spring (4) and control plunger (3).

Replace the seal ring (O-ring) (2) on the control plunger. Install the control plunger and the control spring.

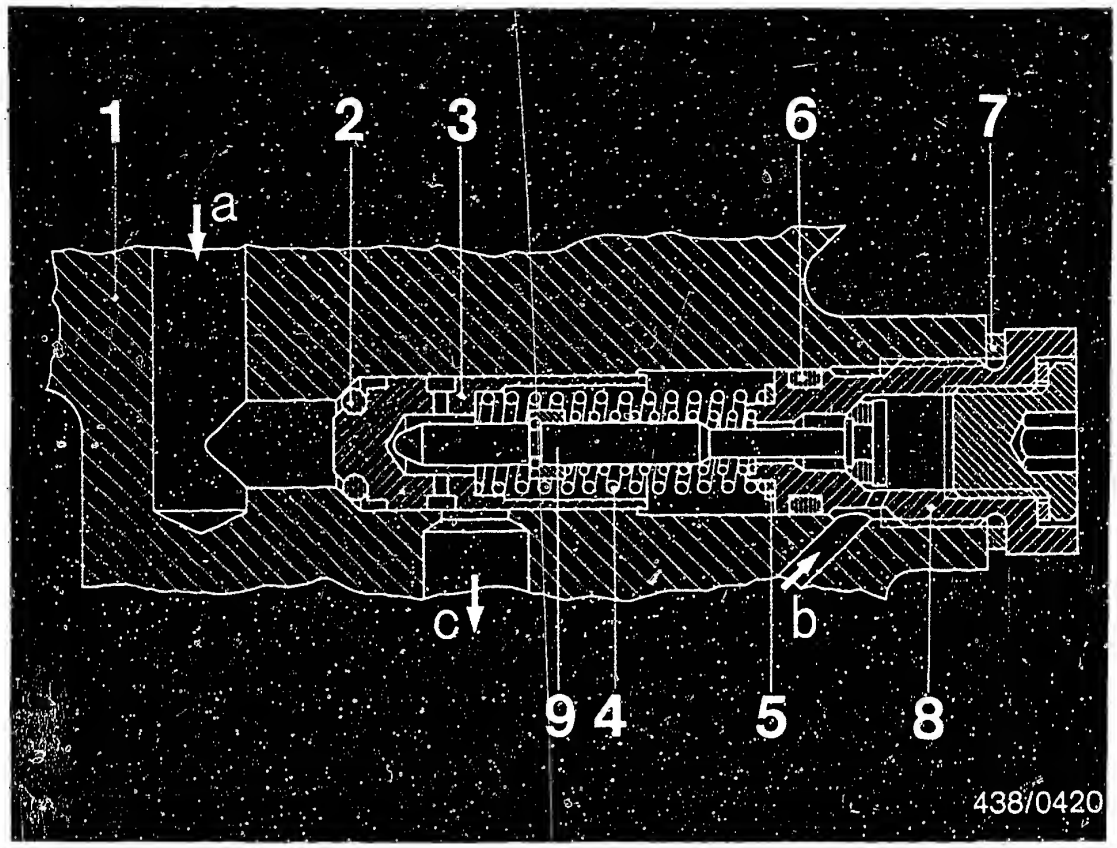
Screw in the screw plug with the complete push-up valve and with shims (as found when removing) and new seal rings (6 and 7).

Finally, check the primary pressure and, if necessary, adjust by changing the shims (5).

Primary pressure:

Fuel distributor 0 438 100 121

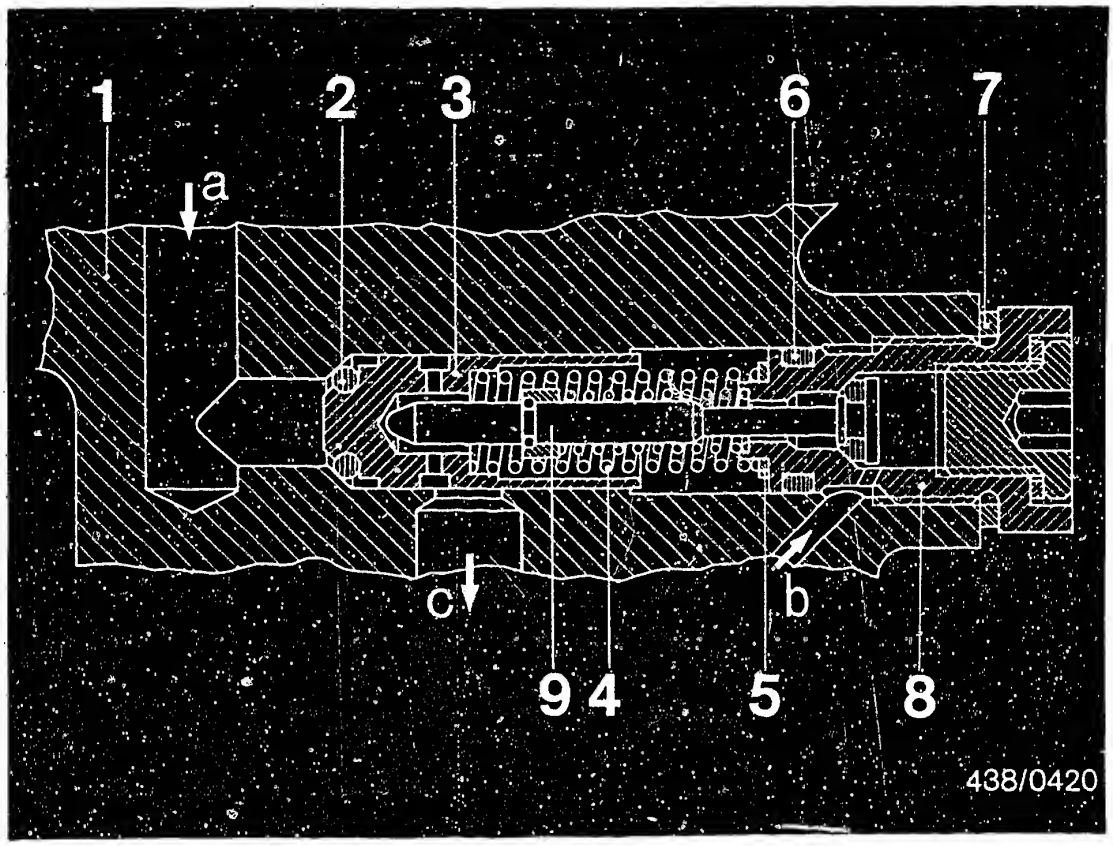
Checking value 4,7...5,4 bar (4,8...5,5 kgf/cm²) gauge pressure
Setting value 4,9...5,1 Bar (5,0...5,2 kgf/cm²) gauge pressure



a = Primary pressure
b = From warm-up regulator
c = Fuel return
1 = Fuel-distributor housing
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
6 = O-ring
7 = Flat seal ring
8 = Screw plug
9 = Push valve

16.5 Possible causes of defect in the control-pressure circuit

The push valve in the primary-pressure regulator has a leak. Since the seal ring of the push valve is rigidly vulcanized onto the valve needle, the whole push valve (ready-assembled unit) must be changed.



a = Primary pressure
b = From warm-up regulator
c = Fuel return
1 = Fuel distributor housing
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
6 = O-ring
7 = Flat seal ring
8 = Screw plug
9 = Push valve

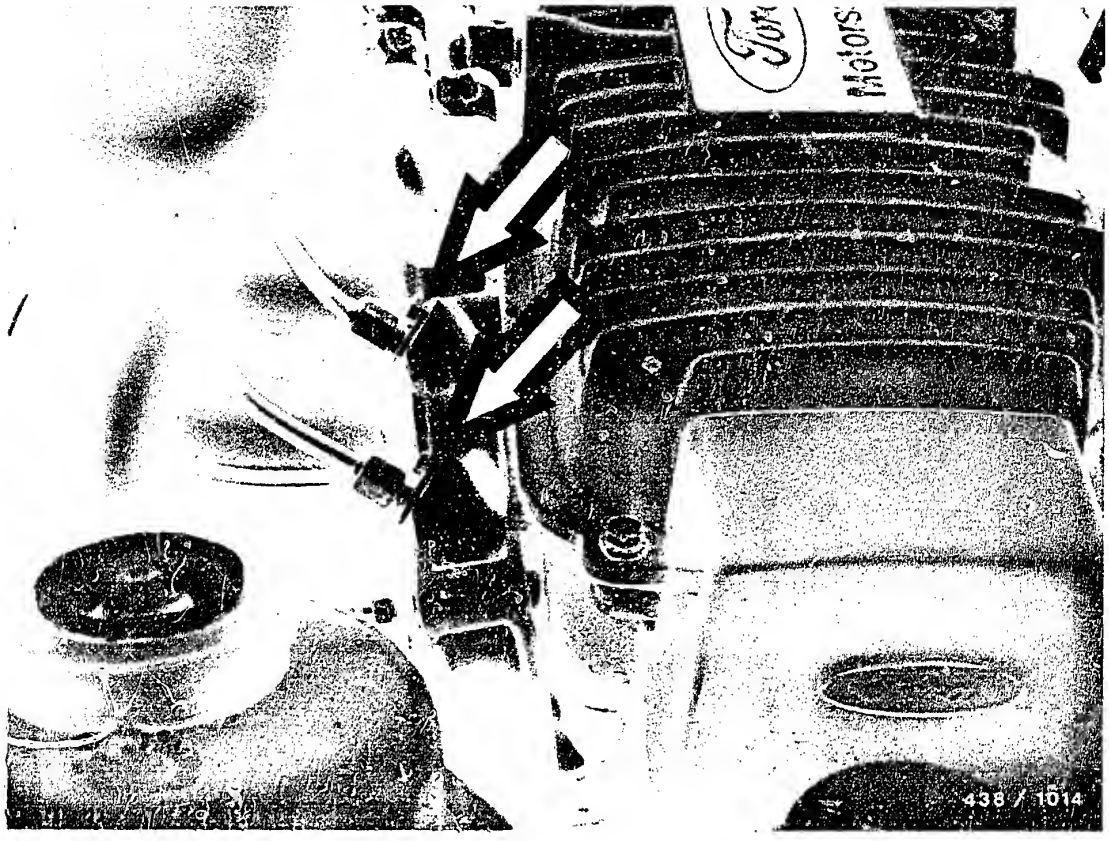
Clean the fuel distributor in the region of the primary-pressure regulator. Screw out the large screw plug together with the complete push valve. Pay attention to control spring and shims.
Screw in new push valve using the number of shims as when removed, new O-ring and flat seal ring.
Finally, check the primary pressure and, if necessary, adjust by changing the shims.

Test specifications and settings for primary pressure (gauge pressure)

Fuel distributor part number: 0 438 100 121

Checking value: 4.7...5.4 bar (4.8...5.5 kgf/cm²)

Setting value: 4.9...5.1 bar (5.0...5.2 kgf/cm²)



17. Testing the injection valves

Remove the injection valves for testing.

17.1 Removing the injection valves

The injection valves are inserted into the flanges of the individual intake ports on the cylinder head and are secured by holding plates and screw (arrows).

To loosen the union nut of the injection line, firstly unscrew the fastening screw for the holding plate, withdraw the valve slightly so that counter-force can be applied to the fixed hexagonal section of the injection valve.

Important:

The connection of the fuel lines between the steel part and the plastic part is by a multiple plug-in connector.

This connector must not be undone since this leads to damage to the seals.

After it has been plugged together again, therefore, there is no longer the guarantee of proper sealing.

17.2 Test equipment and test media

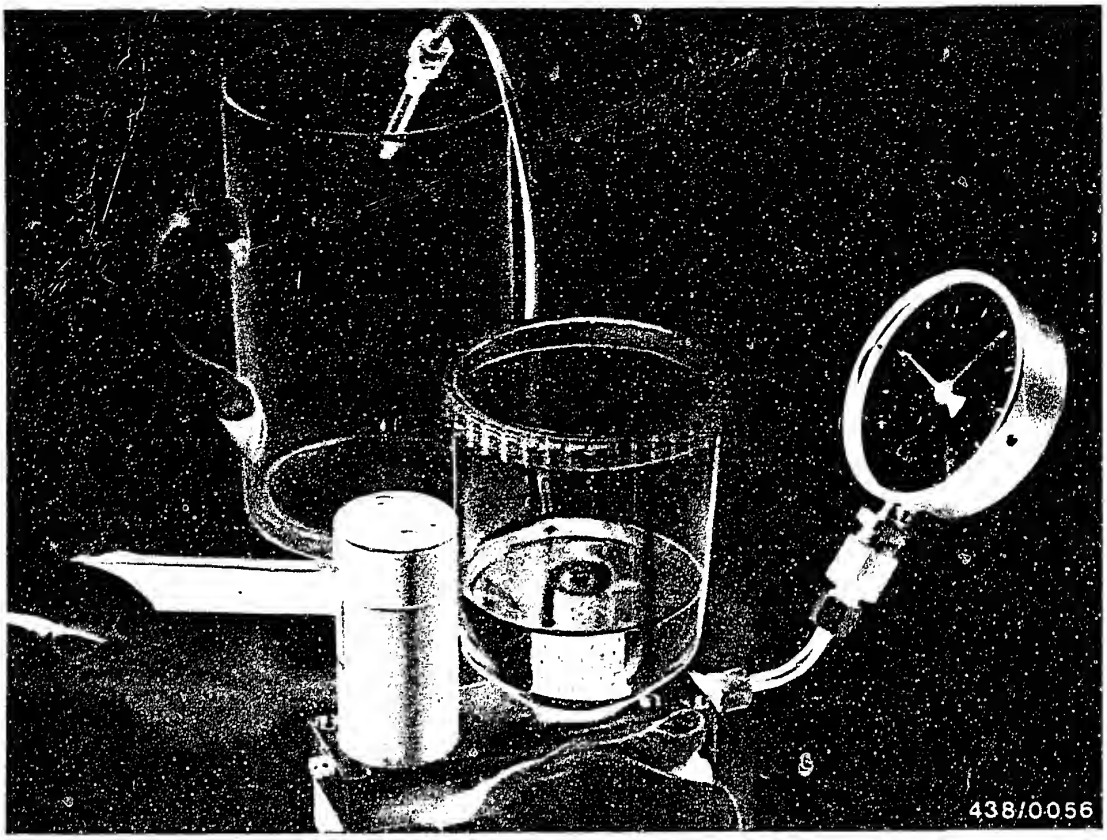
The following testing specification refers to valve testers KDJE-P 400 (previously KDEP 7452) and 0 681 200 700.

Observe the test-media specification!

Test media: Calibrating fluid (Shell K 30, Esso-Varsol, Shell Mineral Spirits 135)
or
Bosch, Part No. VS 14 942-CH
Former Part No. 5 973 340 650
The calibrating fluid can be obtained in 5 l metal cans from the following supplier:

Firma
Oskar Gnamm GmbH
D-7531 Kämfelbach-Bilfingen

Caution:
For safety reasons, never use normal gasoline or similar easily inflammable and combustible liquids.
Even with calibrating fluid, be sure to observe the local official regulations.

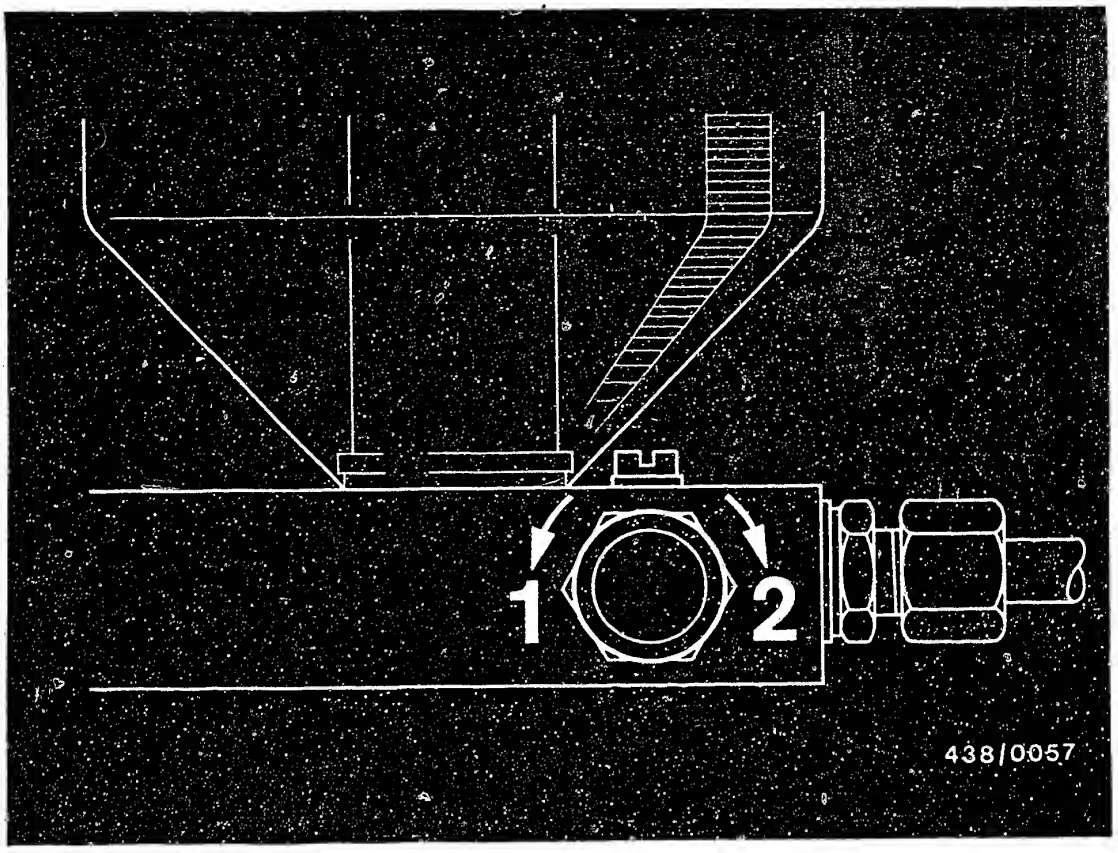


17.3 Connecting the injection valve to the tester

Connect the injection valve to the valve tester and bleed the delivery line by operating the lever several times with the union nut open. Ten tighten the union nut.

17.4 Checking for dirt

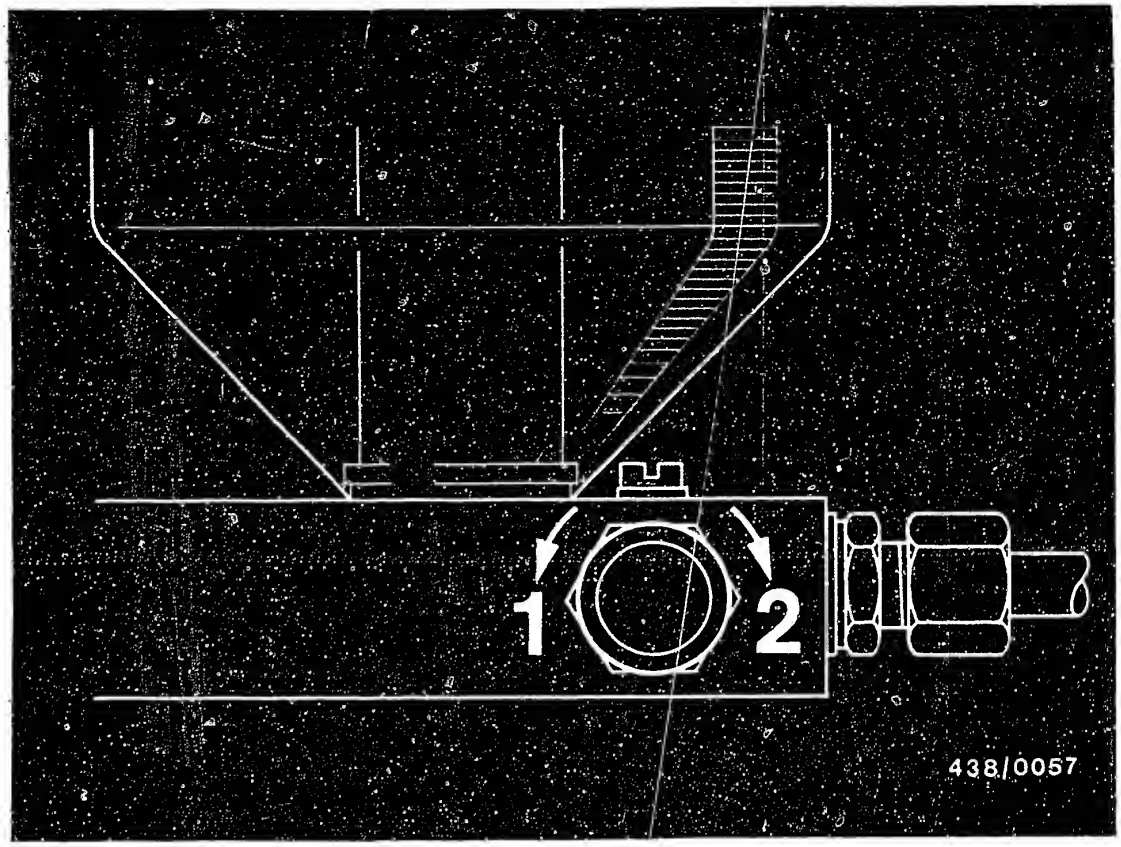
Move the hand lever slowly (about 2 seconds per stroke) back and forth with the stopcock on the pressure gauge open. If the pressure does not build up to 1...1,5 bar gauge pressure, the injection valve has a bad leak (caused, for example, by dirt stuck in it).
You can try to flush the injection valve clear by moving the lever back and forth several times strongly.
If this attempt is successful, continue the test. If it is not possible to flush the valve clear, replace it.



17.5 Testing the opening pressure

Test specifications for opening pressure:

Injection valve part number	Opening pressure
0 437 502 015	3.0...4.1 bar (3.1...4.2 kgf/cm²)

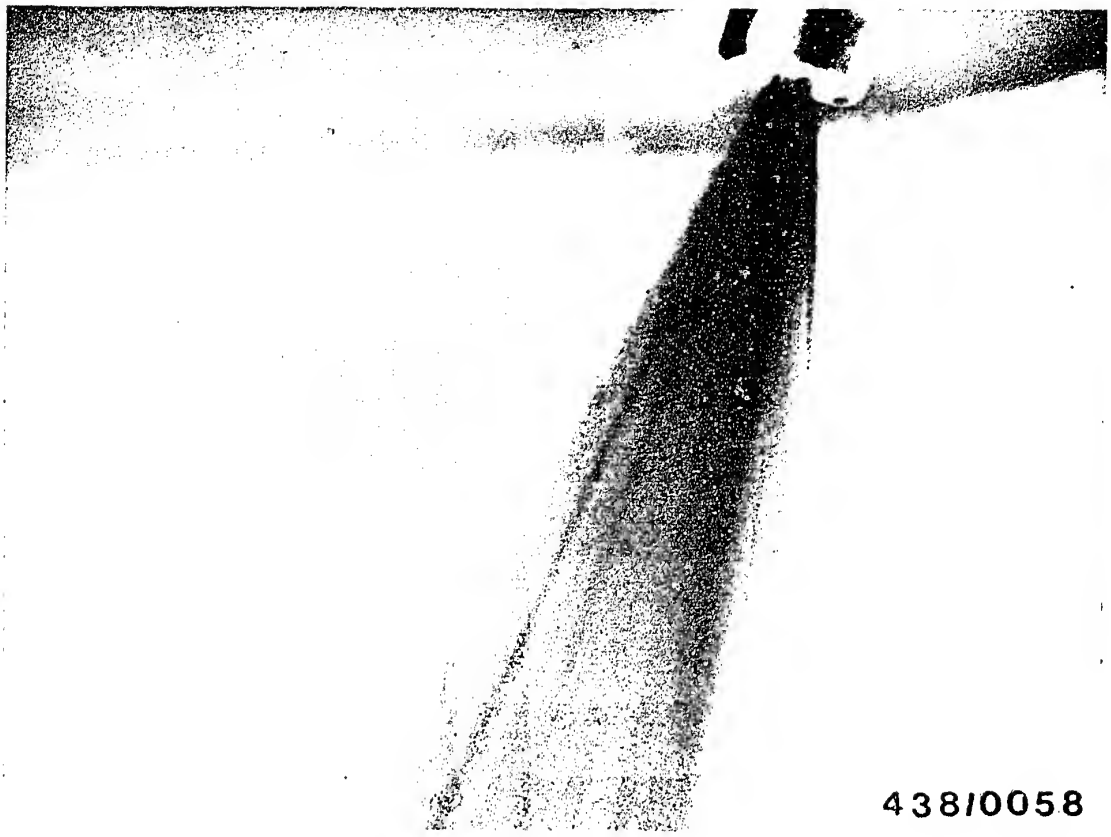


With the stopcock closed, flush the valve out and bleed it with several rapid movements of the lever.
Open the stopcock and test the opening pressure by moving the lever slowly (about 2 seconds per stroke).

If the opening pressure is outside tolerance, replace the injection valve. Individual valves can also be interchanged within a set.

17.6 Leakage test

Open the stopcock, build the pressure up slowly to a value 0.5 bar under the opening pressure determined previously (but not less than 2.3 bar gauge pressure), and hold it constant at that level. No drops must now fall from the valve for the next 15 seconds.



438/0058

17.7 Chatter test, evaluation of spray

Move the lever back and forth at about 1 stroke per second. As this is done, the valve must chatter. No drops of fuel must form at the mouth of the valve. The valve must not produce a "cord spray". Formation of a single-sided, atomized spray within an overall spray angle of about 35° is permissible (see example given in illustrations).

Illustration shows good spray formation.

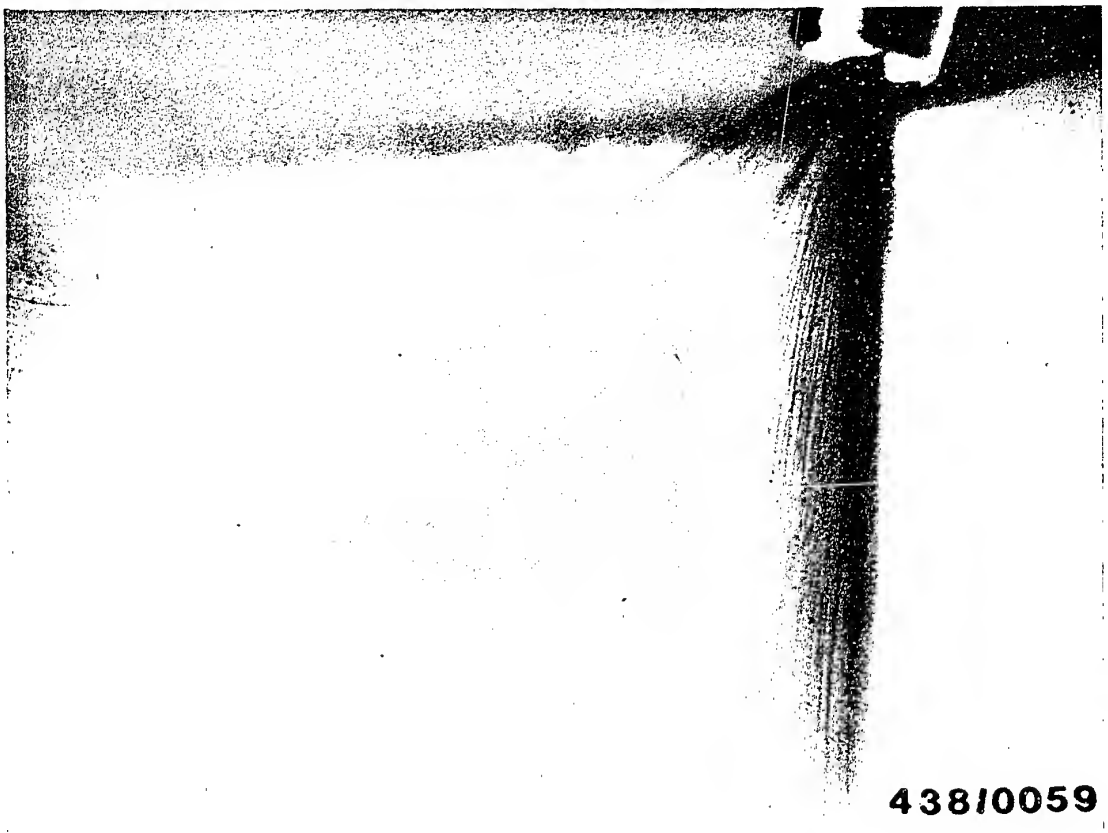
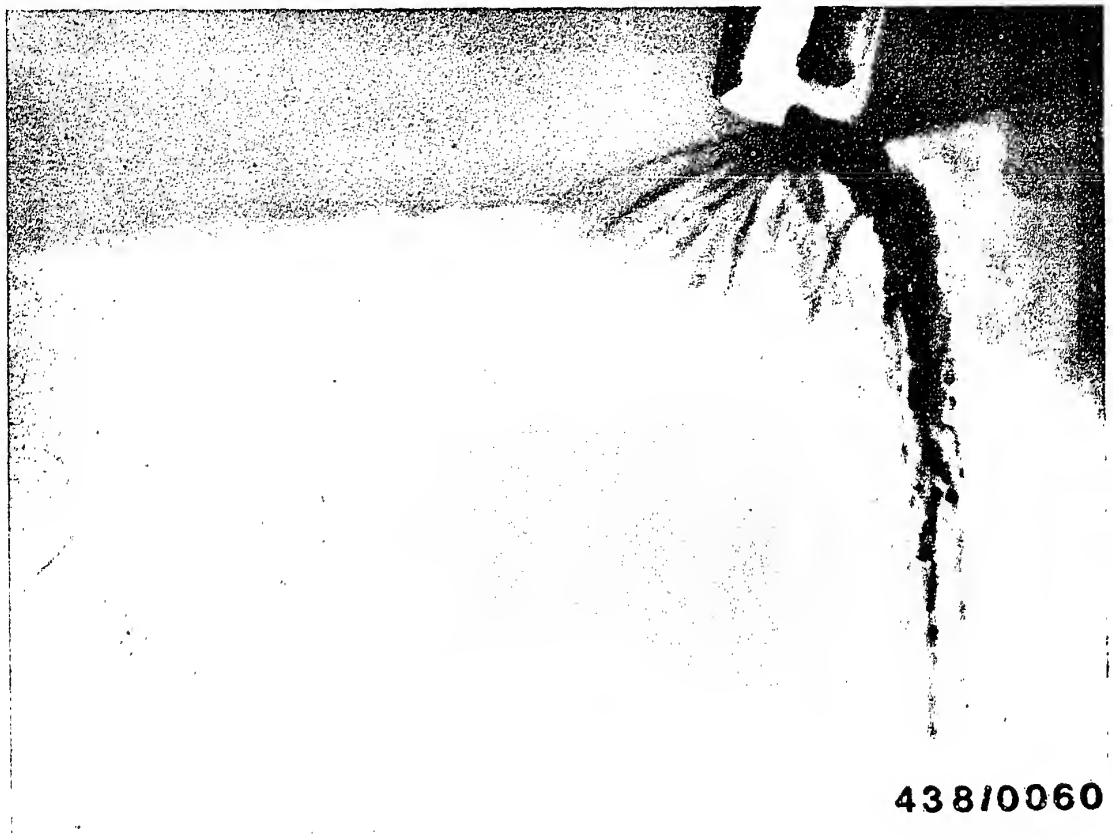


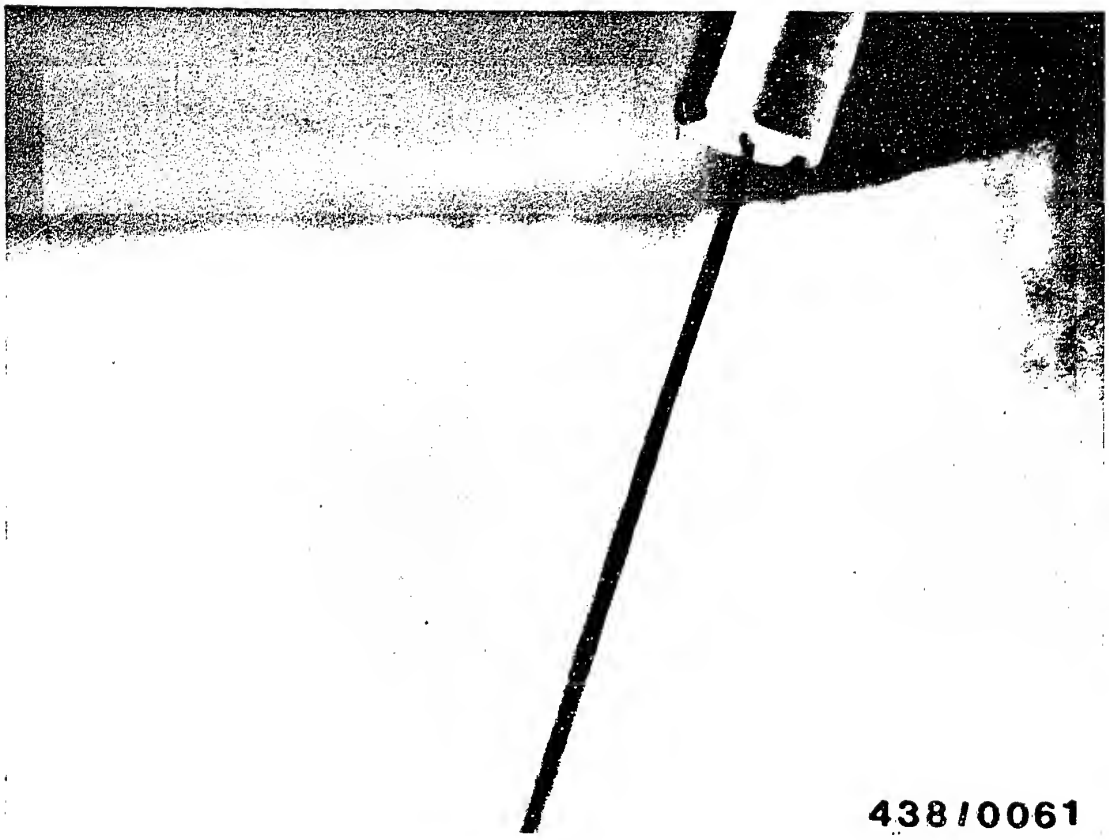
Illustration shows single-sided but nevertheless good spray formation.



438/0060

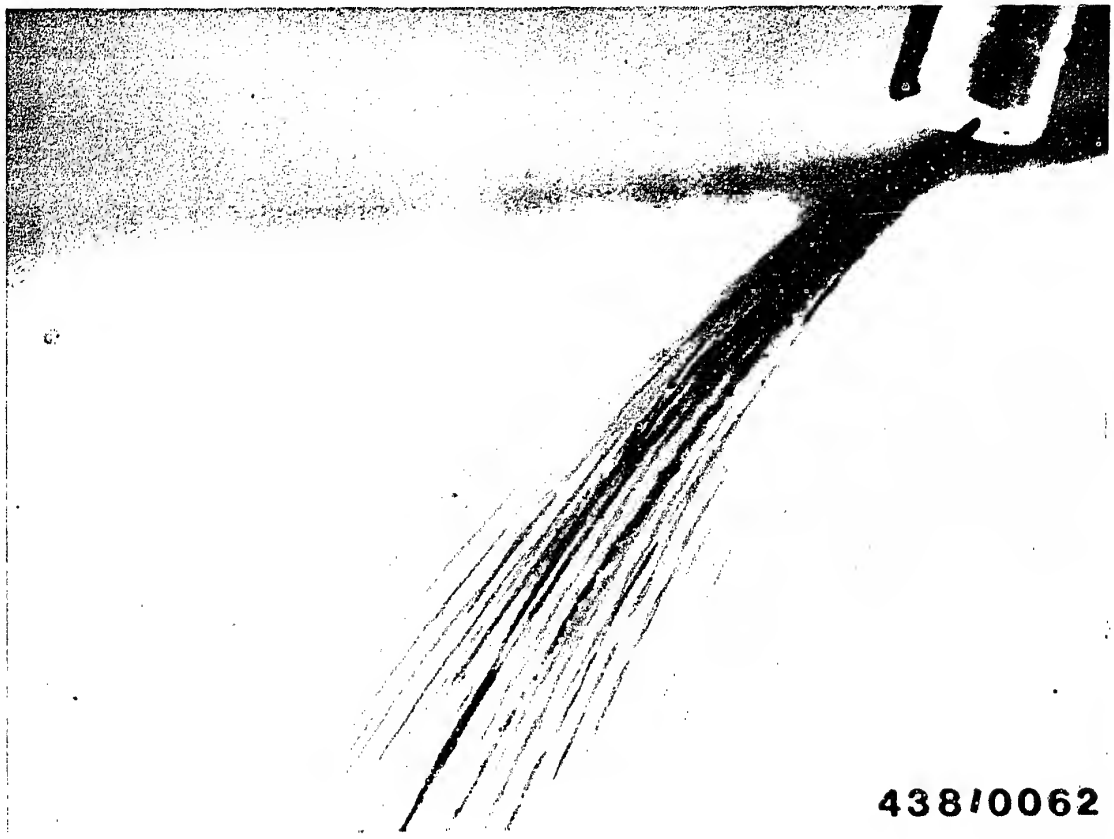
Poor spray formation; replace injection valves.

Illustration shows drop formation.



Poor spray formation; replace injection valves.

Illustration shows "cord" spray.

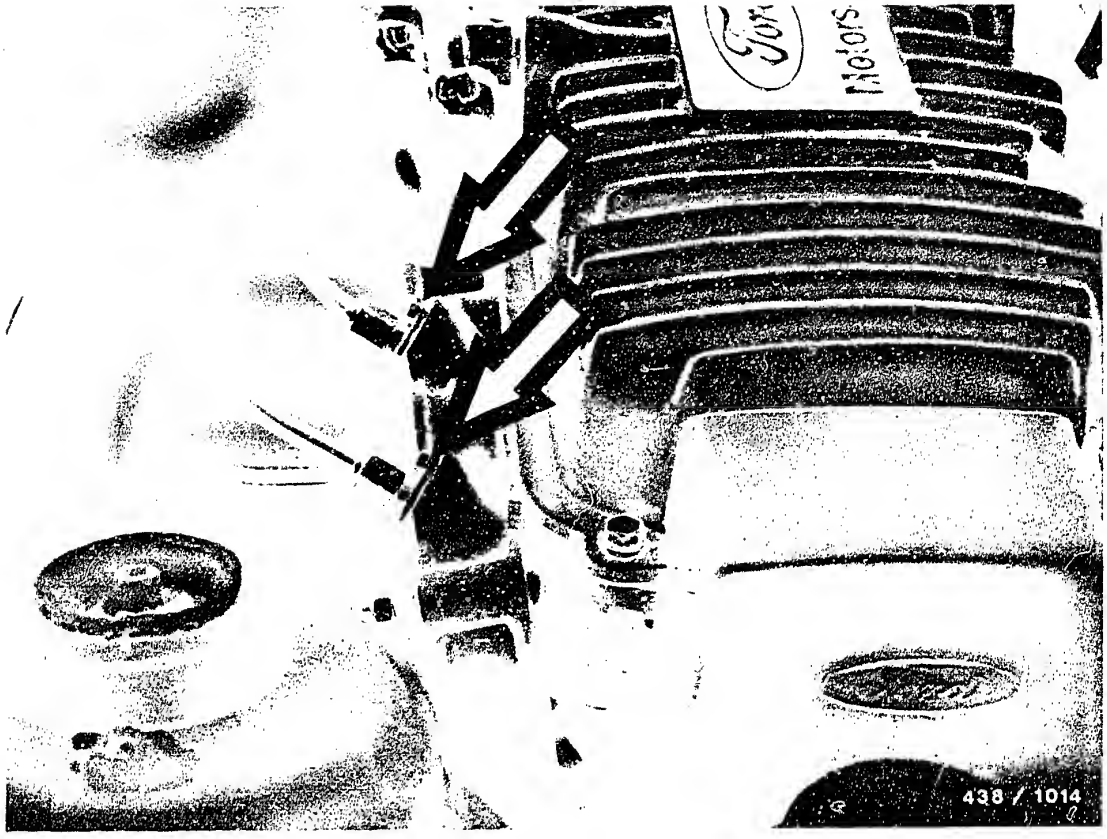


Poor spray formation; replace injection valves.

Illustration shows "spray in strands".

If defective injection valves have been replaced, it is necessary finally to adjust the idle speed with the engine at normal operating temperature.

Idle-speed adjustment is described on Coordinates F 16.



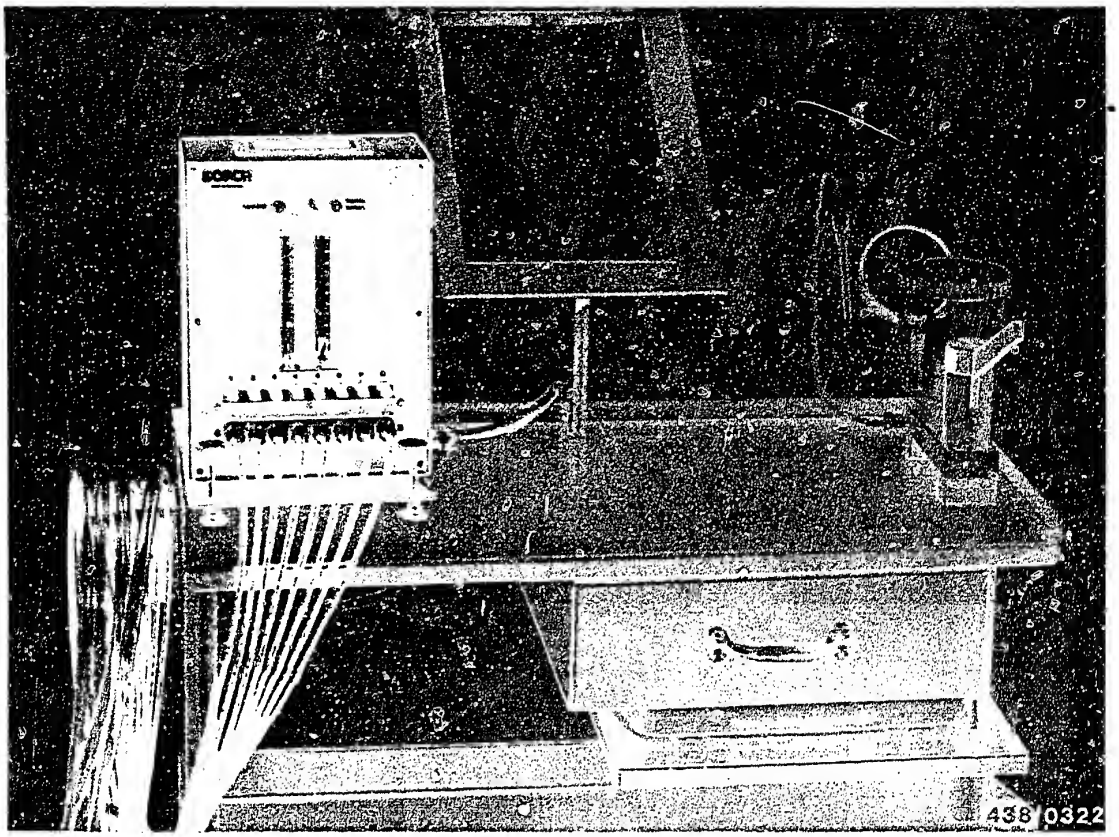
17.8 Installing the injection valves

Check the seal rings on the stem of the injection valves (arrows) for deformation and damage; if necessary, use new seal rings (Ford service parts).

Insert the valve with holding plate into the mounting bore in the flange of the intake port so that the hexagonal section is still accessible. Connect the delivery line.

Apply counter-force at the fixed hexagonal section in order to tighten the union nut.

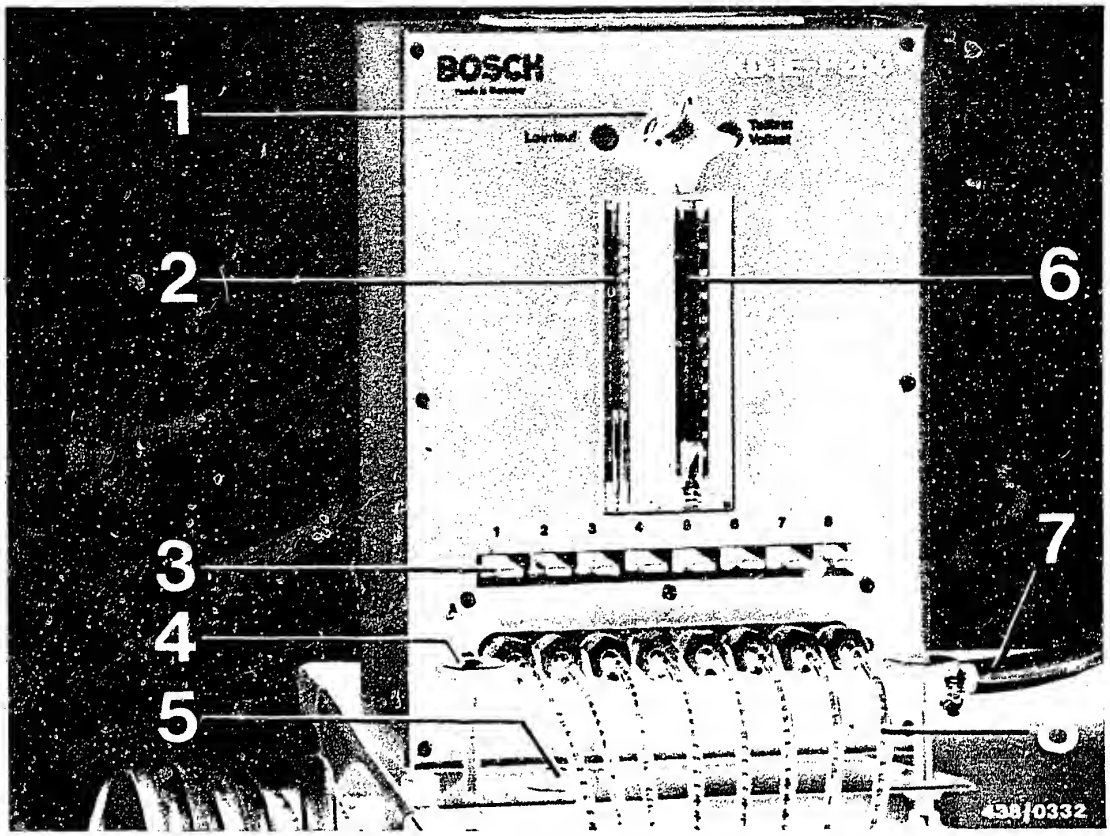
Press in the valve fully and secure the holding plate.



18. Comparative measurement of fuel delivery of fuel distributor outlets.
This test is carried out using the tester for delivered quantity comparison KDJE-P 200 (previously KDJE 7451).

18.1 Application

By means of comparative measurements, the differences in the amounts of fuel delivered from the individual outlets on the fuel distributor are determined.
The tester is designed so that the test can be made on the vehicle without having to remove the fuel distributor.
Since the test is made with the original injection valves, the operator can recognize at the same time whether delivered-quantity scatter, if it occurs, is caused by the fuel distributor or by the injection valves.



1 = 3-way cock
2 = Small rotameter tube
3 = Keyboard for 8-way valve
4 = Adjusting screw for setting up
5 = Spirit level
6 = Large rotameter tube
7 = Return hose
8 = Polyamide hose lines (test lines)

18.2 Construction

The tester is designed for use with all engines, up to 8 cylinders, equipped with K-Jetronic.

Basically, the tester consists of a steel housing containing 2 rotameter tubes with measuring ranges of 2...15 cm^3 and 10...180 cm^3, an 8-way valve for key operation (Item 3) and a 3-way stopcock (Item 1).

The small rotameter tube (Item 2) is used for the idle measurement while the large tube (Item 6) is used to measure the fuel delivery at part- and full load. The particular rotameter tube to be used is connected by means of the 3-way stopcock. Using the 8-way valve, the fuel delivery of each cylinder is tested one after the other.

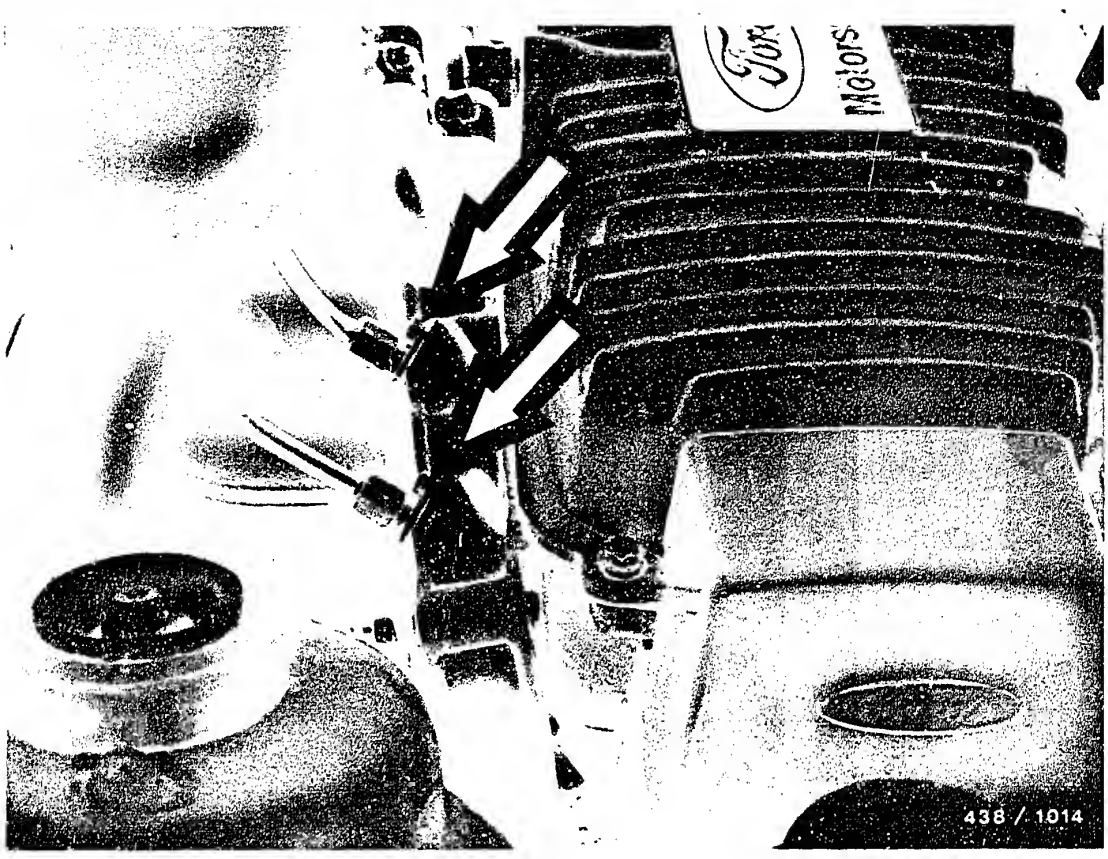
Attached to the tester are 8 hoses (Item 8), each terminated with an automatic connector. When the injection valves are withdrawn from their sockets on the engine they are attached to these connectors. Each automatic connector is fitted with a push valve so that no fuel can escape from connectors that are not in use (when 4- or 6- cylinder systems are tested).

The fuel is returned to the fuel tank through a hose (Item 7) about 5 m long.

The entire test is made with a closed circuit, i.e. no fuel escapes.

18.3 Setting up and connecting the tester for delivered quantity comparison:

Set up the tester next to the vehicle on a firm base (e.g. on tester trolley KDJE-W 100) and align using the built-on spirit level on the base of the tester.



Since the injection lines in the region of the engine are made of steel, it is advisable to connect the tester for delivered quantity comparison using the adapter lines KDJE - P 200/25.

To do this, remove the injection valves as follows:

The injection valves are inserted into the flanges of the individual intake ports on the cylinder head and are secured by holding plates and screws.

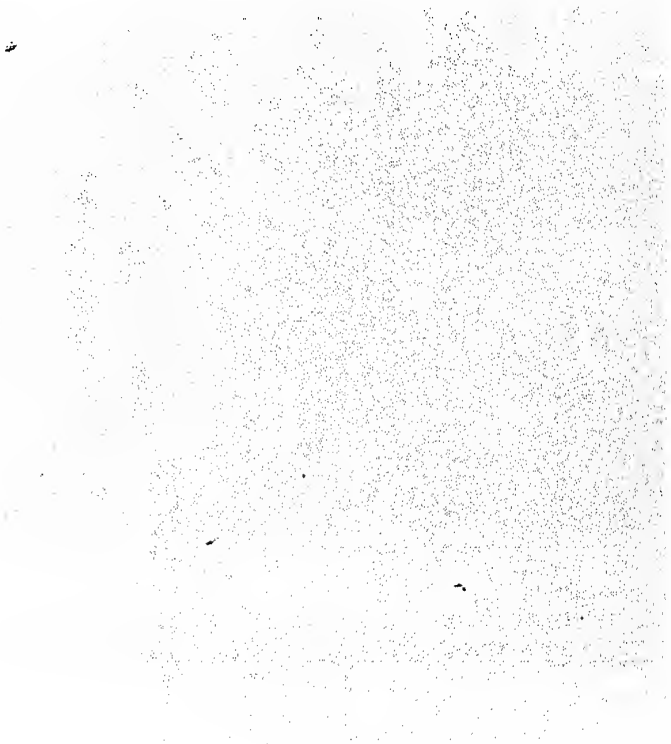
To loosen the union nut of the injection line, firstly unscrew the fastening screw for the holding plate, withdraw the valve slightly so that counter-force can be applied to the fixed hexagonal section of the injection valve.

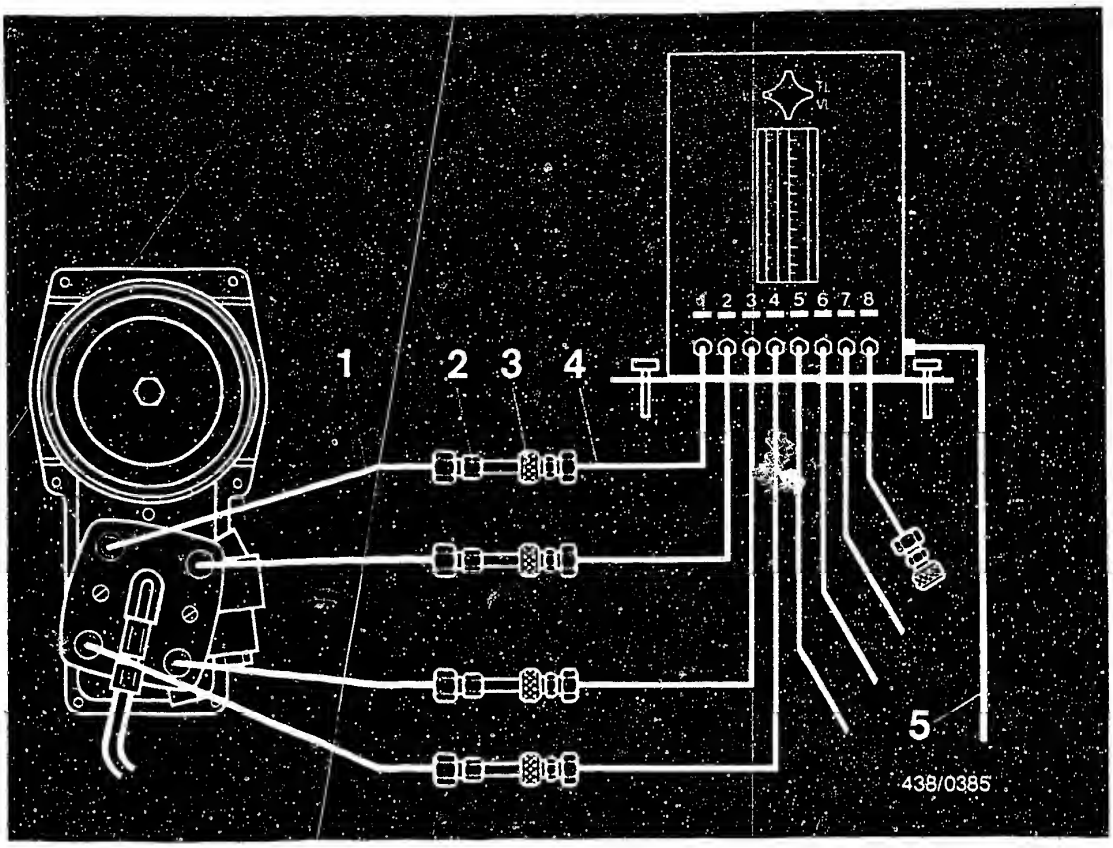
Important:

The connection of the fuel lines between the steel part and the plastic part is by a multiple plug-in connector.

This connector must not be undone since this leads to damage to the seals.

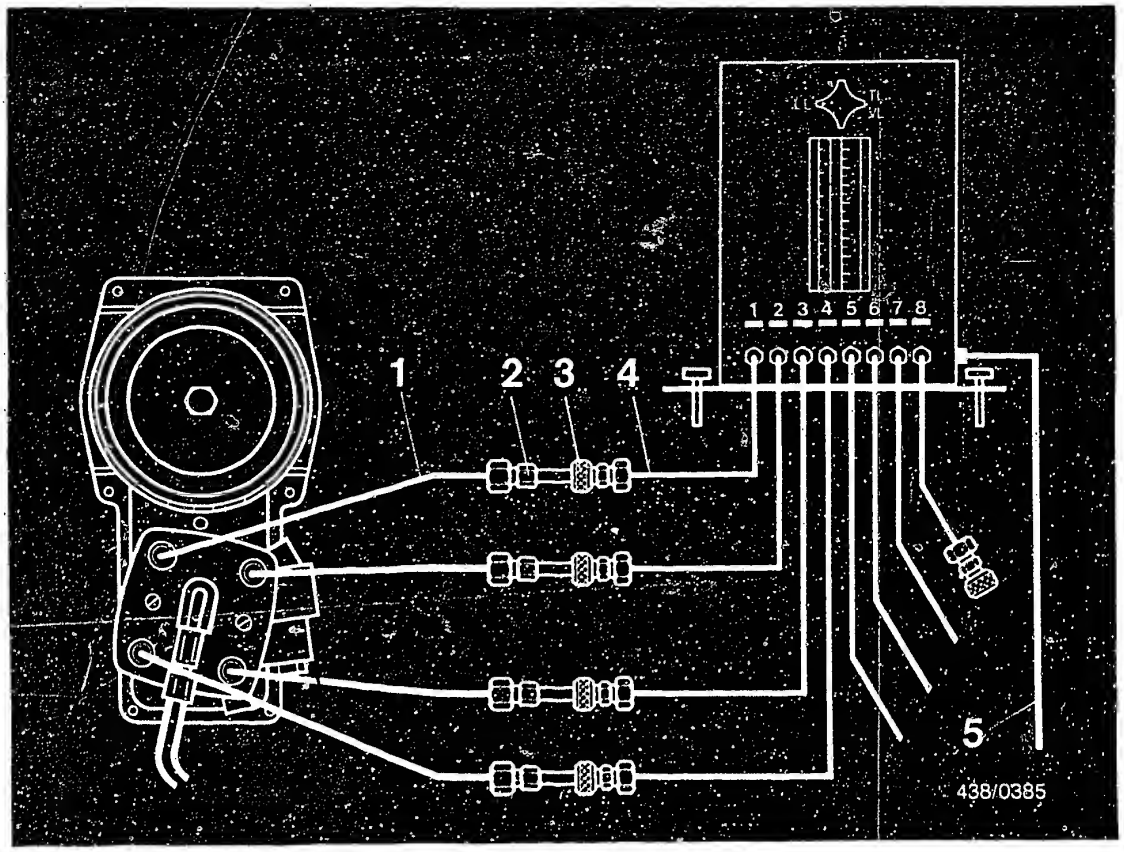
After it has been plugged together again, therefore, there is no longer the guarantee of proper sealing.





1 = Adapter lines KDJE-P 200/25
2 = Injection valves
3 = Automatic connectors
4 = Tester lines
5 = Return line to fuel tank filler neck

Unscrew the injection lines from the fuel distributor and screw the adapter lines onto the fuel distributor using the appropriate double threaded fitting M 10 x 1 / M 8 x 1 .



Using a rag, clean the stem of the removed injection valves and connect to the adapter lines.

Plug the injection valves in the appropriate order into the automatic connectors of the first 4 tester lines.

Note:

Plug in the injection valves firmly as far as they will go and tighten the knurled nuts so that the non-return valves of the automatic connectors are fully opened. Introduce the return hose of the tester into the fuel tank filler neck.

18.4 Bleeding the tester for delivered quantity comparison:

Remove the air-intake dome so that the air-flow sensor plate is accessible.

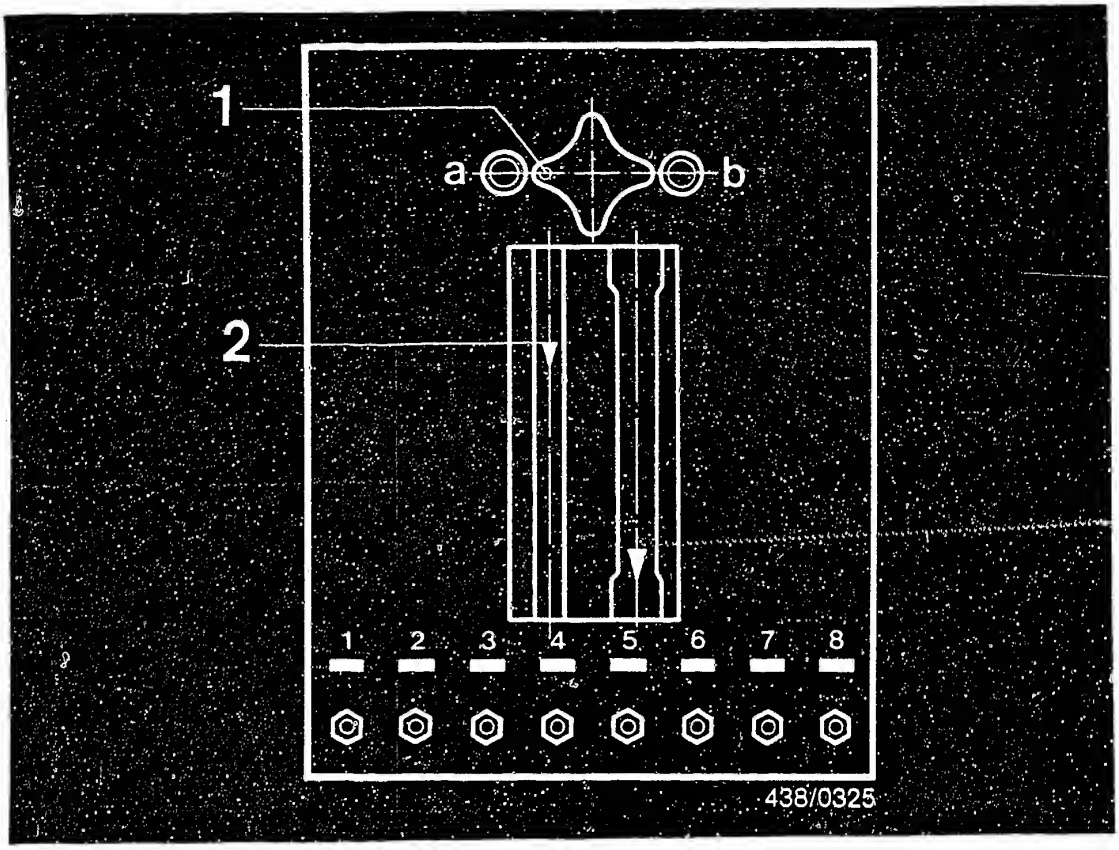
Remove the electric connector from warm-up regulator and auxiliary-air device.

Switch on the electric fuel pump by bridging the electrical safety circuit.

Lift the air-flow sensor plate as far as it will go.

Press the buttons of the 8-way valve one after the other, switching the 3-way change-over cock repeatedly until both measuring tubes are free of air.

Return the air-flow sensor plate to the rest position.

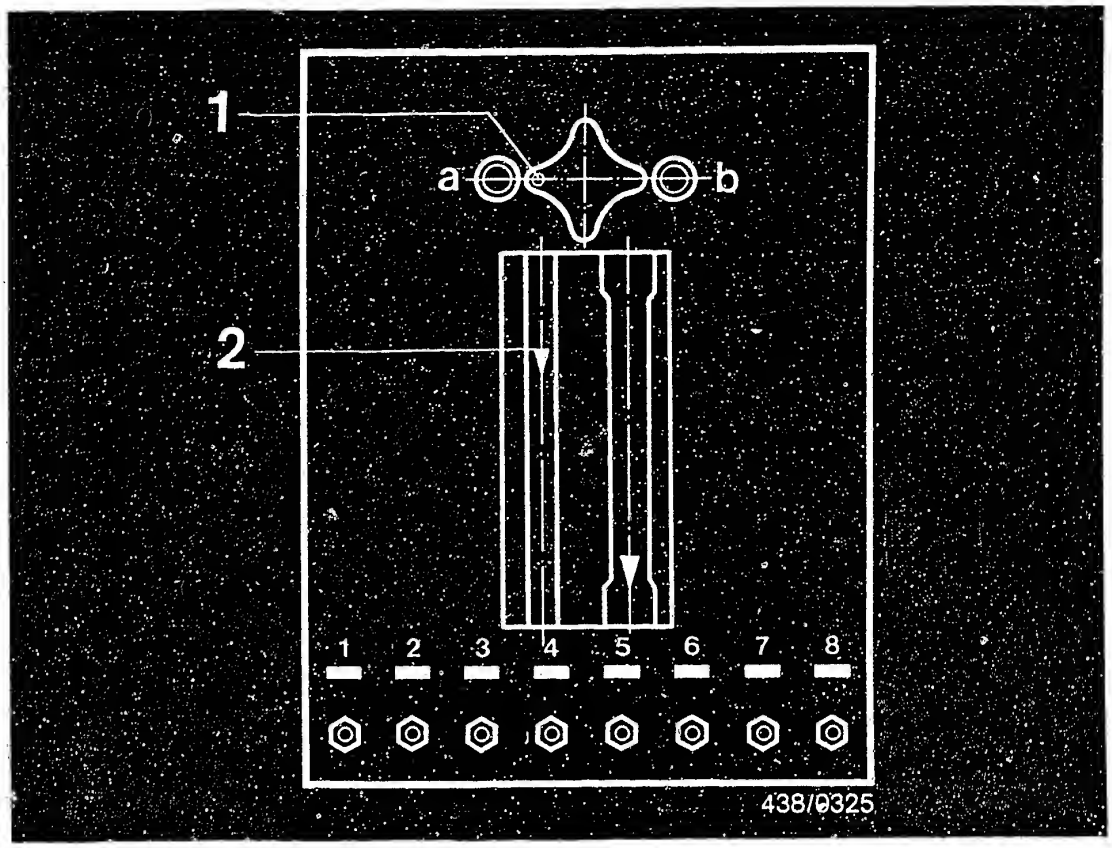


1 = White dot
2 = Measuring line

a = Idle
b = Part load/full load

18.5 Testing

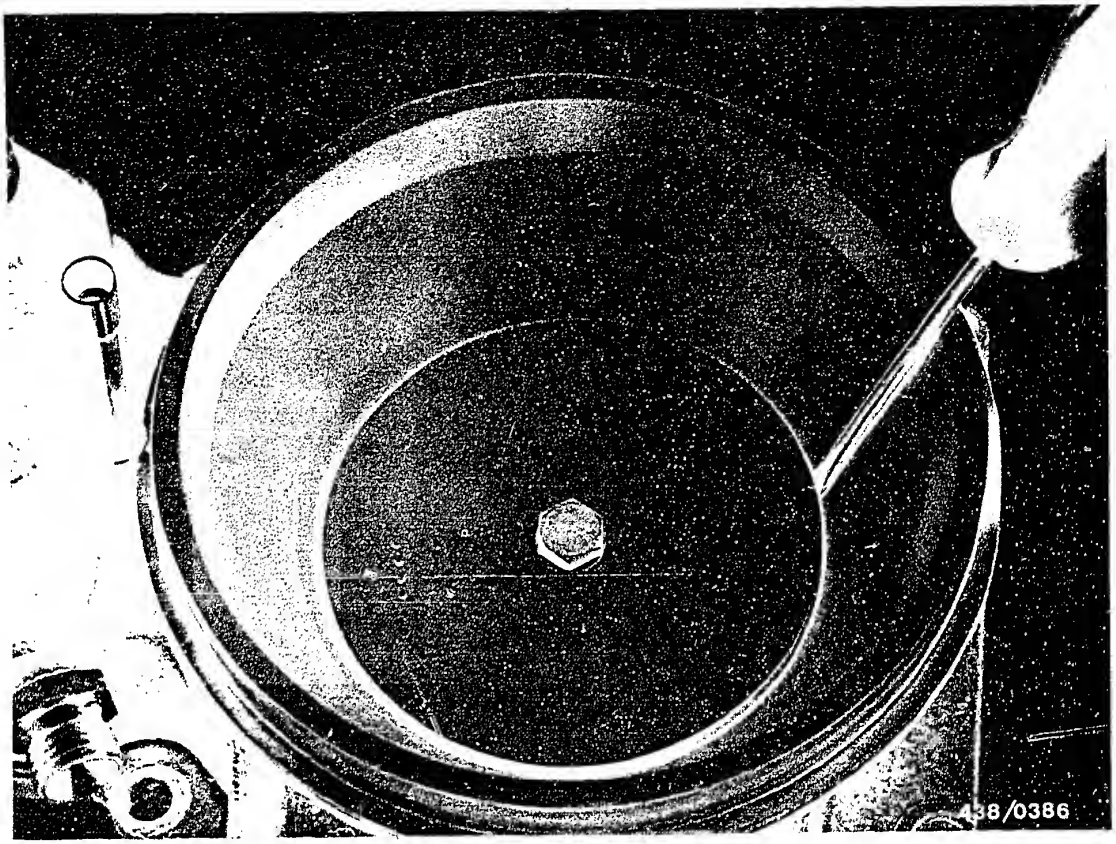
The flow comparison measurement is made in the idle, part-load and full-load ranges.
The small rotameter tube is to be used for the idle measurement (white dot to the left on control knob); part-load and full-load measurements are made using the large rotameter tube (white dot to the right).



1 = White dot
2 = Measuring line

a = Idle
b = Part load/full load

The delivered quantities indicated on the rotameter tubes are read off at the top edge of the conical float (Item 2). On testers with a ball float the uppermost point of the ball is used for reading off. With each measurement be sure to wait until the float has reached its final position. This may take 20 ... 30 seconds in the case of small deliveries.



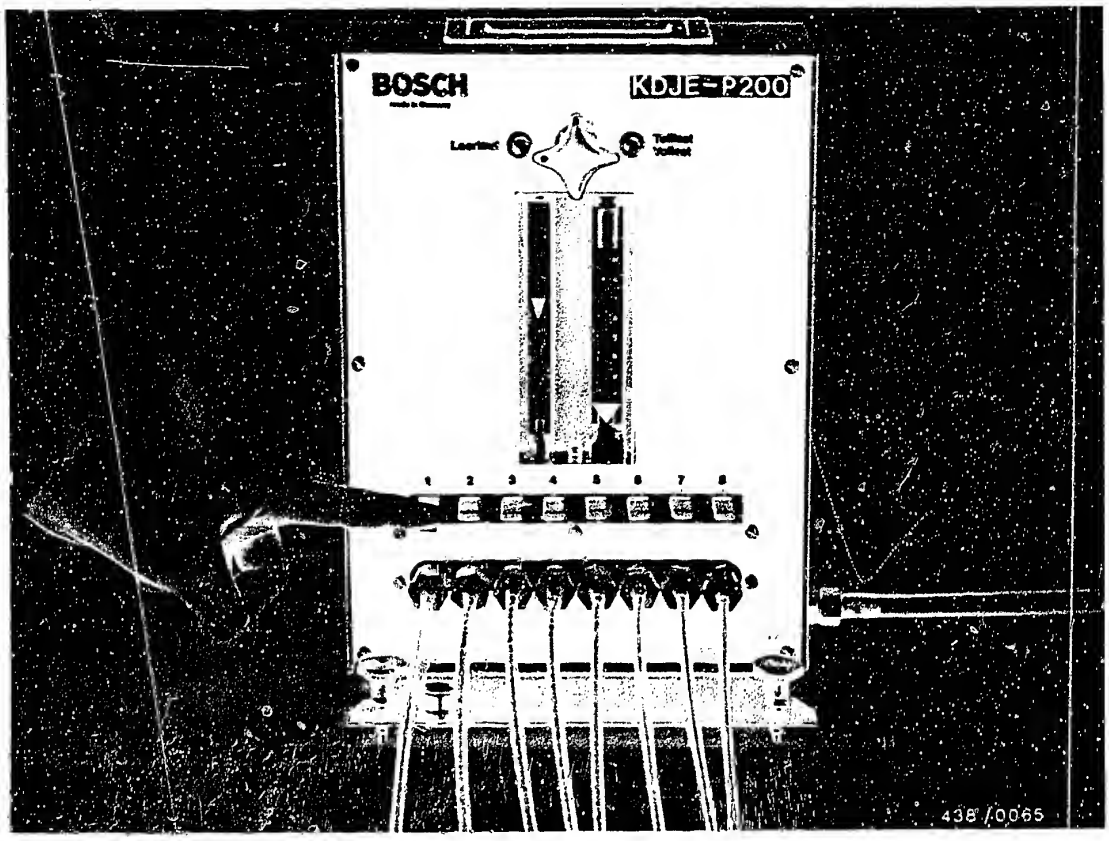
The exact setting and locating of the position of the air-flow sensor plate for the various load ranges is done using a screwdriver (a small one for the idle position), which is inserted to an appropriate depth between the air funnel and air-flow sensor plate.

Procedure:

Switch on the electric fuel pump by bridging the electrical safety circuit.

Fixed numerical values are specified in the following test section for the maximum permissible fuel delivery differences for the individual load ranges.

The "setpoint" value always pertains to the fuel-distributor outlet with the lowest fuel delivery, i.e. in each case the outlet with the lowest delivery is to be first ascertained.



Press the key for outlet 1. Pivot the air-flow sensor plate until the corresponding rotameter tube approximately indicates the "set point" value. Fix the air-flow sensor plate in this position.

Test the remaining outlets in order to determine which outlet has the lowest fuel delivery.

Press the key for this outlet again, and set the delivery precisely to the "set point" by correcting the position of the air-flow sensor plate. Then fix the air-flow sensor plate in this position again.

Press the remaining keys one after the other, and determine the maximum fuel delivery of each outlet. A deviation in fuel delivery can only be above the "set point".

18.6 Test specifications

	Setpoint (cm^3/min)	Max. permissible fuel delivery (cm^3/min)
Idle	6.0	6.8
Part load	40.0	44.0
Full load	110.0	120.0
The full-load delivery (setting point) must be obtained at least from each outlet with maximum deflection of the air-flow sensor plate.		

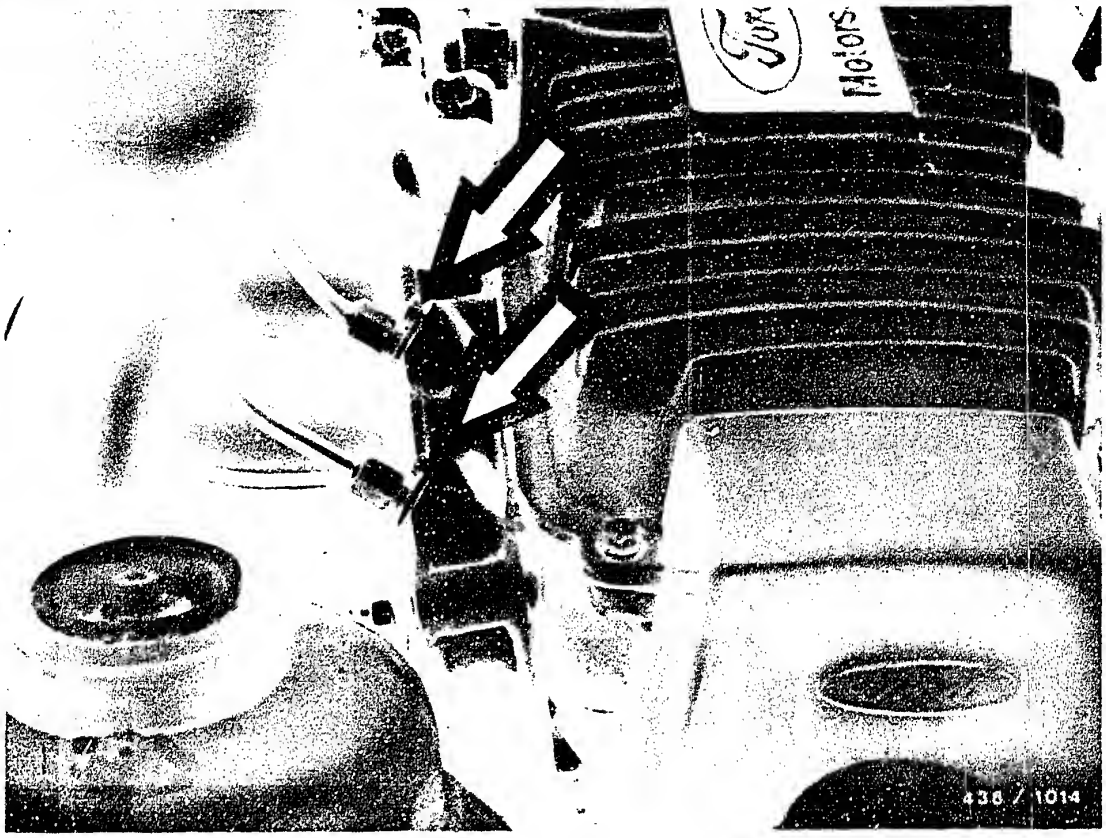
If, in testing, a too large difference is ascertained in one of the three load ranges, the test should for safety's sake be repeated.

If the result is confirmed, you should check whether the fault lies in the fuel distributor or in the injection valves.

To do this interchange the injection valves with the greatest and smallest difference.

If the result is still the same, the fault is in the fuel distributor. If the fault follows the interchanged injection valves, it lies in the injection valves.

Change defective fuel distributor and/or replace defective injection valves.



18.7 Final operations

Reinstall the injection valves as follows:

Check the seal rings on the stem of the injection valves for deformation and damage; if necessary, use new seal rings (Ford service parts).

Insert the valve with holding plate into the mounting bore in the flange of the intake port so that the hexagonal section is still accessible. Connect the delivery line.

Apply counter-force at the fixed hexagonal section in order to tighten the union nut.

Press in the valve fully and secure the holding plate. Then test the idle adjustment, and correct if necessary.

19. Idle-speed adjustment

19.1 Test conditions:

Warm the engine for adjusting the idle speed (oil temperature approx. 80°C).

Important note:

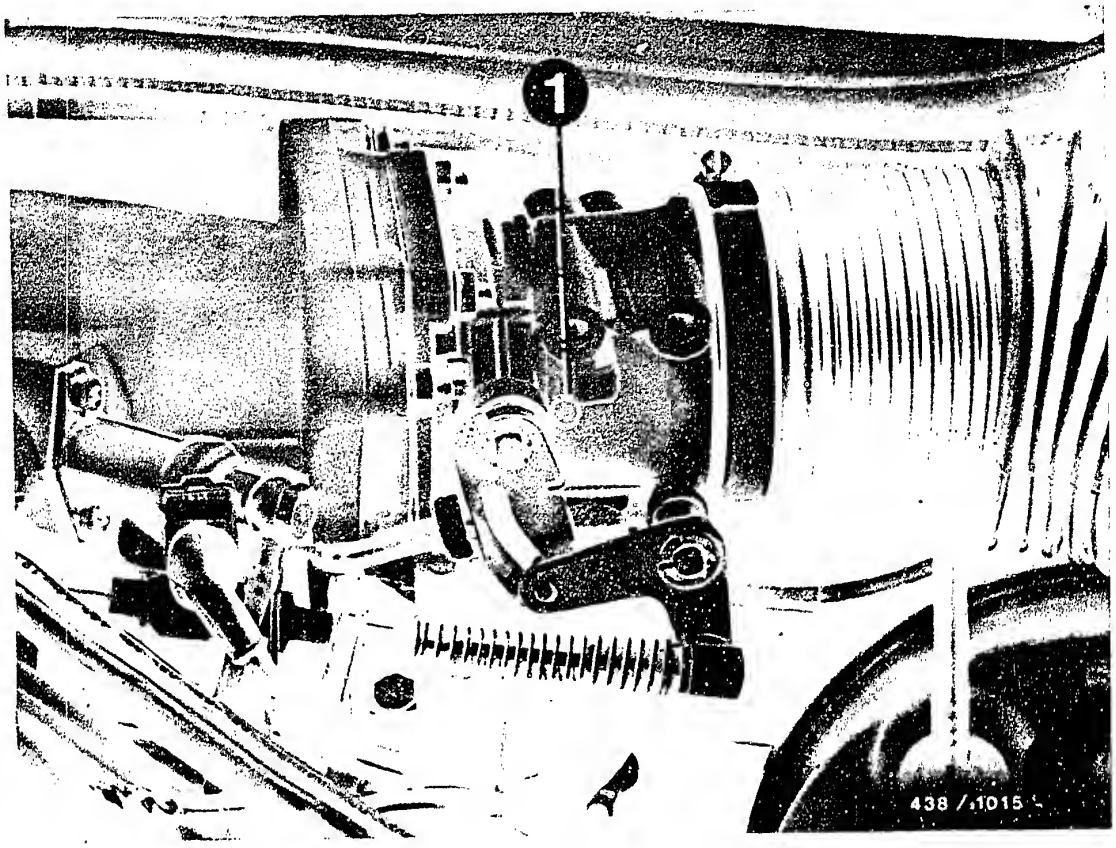
If the fuel-injection tubing or injection valves were loosened or removed, the engine should be warmed up under load. The low rate of fuel flow during idling is not always adequate to drive all the air out of the fuel-injection tubing.

The idle speed must not be adjusted when the engine is too hot, e.g. immediately after being raced or after a power measurement on the roller-type test stand.

In vehicles with an air-conditioner, this should be switched off to stabilize the engine speed during idle-speed adjustment.

Rotational-speed measurement with separate tester.

Check that the throttle-plate lever makes contact with idle stop. The cable should be free of tension.

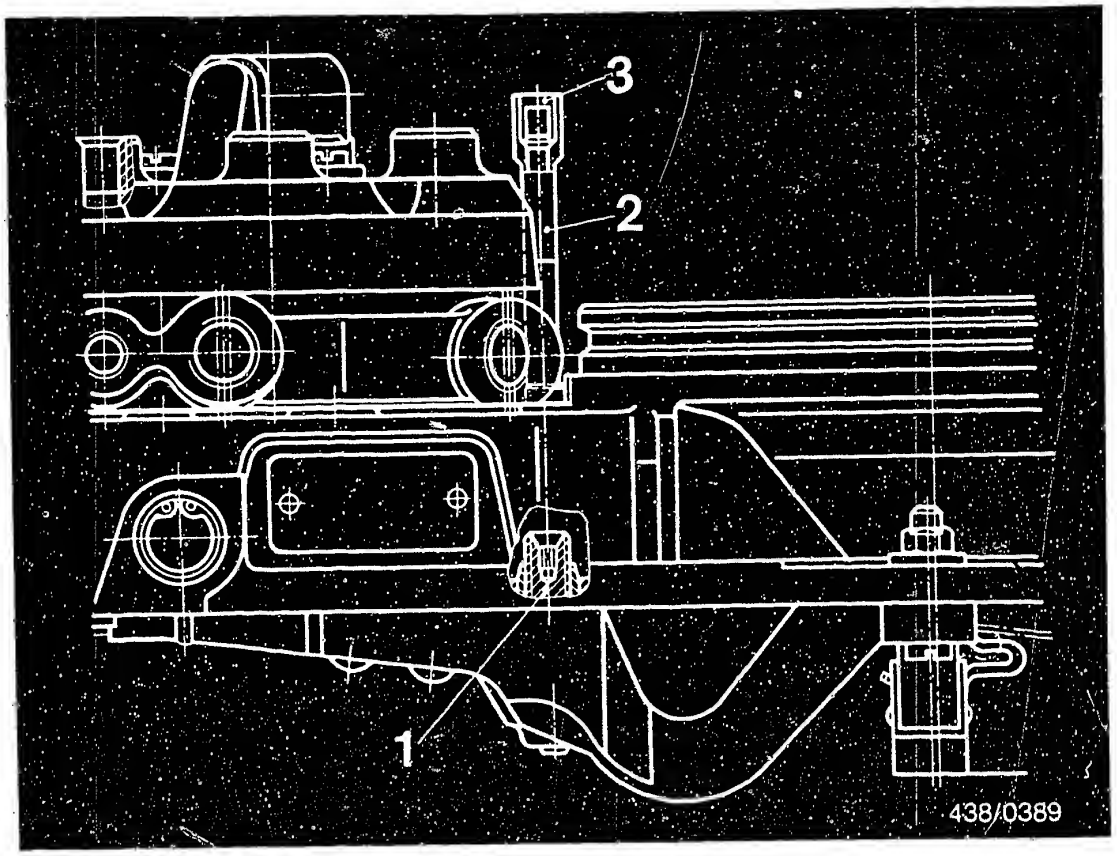


19.2 Test specifications for idle adjustment

Idle speed:	900 ... 1000 min^{-1}
CO concentration:	0.4 ... 0.8 % by vol. CO

19.3 Adjusting the idle speed at the bypass screw on the throttle-valve assembly

The bypass screw (Item 1 - not visible in picture) is situated underneath the throttle-shaft mounting opposite the control lever.



19.4 Adjusting the CO concentration

The CO concentration is adjusted by turning the idle-mixture-adjusting screw (1) in the mixture-control unit using the adjusting wrench KDEP 1035.

After removing the safety cap (3) of the guide tube (2), the adjusting wrench is passed through the guide tube and inserted into the idle-mixture-adjusting screw.

Turning to the right = richer mixture
Turning to the left = leaner mixture

Caution:
Always make the adjustment from the lean side, i.e. if the mixture is too rich turn the idle-mixture-adjusting screw further to the left than necessary and then turn it to the right up to the setting required.

After every adjustment remove the adjusting wrench and accelerate the engine briefly, so that the air-intake system can cool off. Then wait until the indicator of the CO tester has stabilized. Never accelerate the engine with the wrench still in place as this could result in bending the control lever in the air-flow sensor.

19.5 Anti-tamper device for idle-mixture-adjusting screw:

In the Federal Republic of Germany, § 47 of the FMVSS/CUR, "Exhaust Gases and their Discharge", has been amended. This amendment order was printed in full in the Verkehrsblatt 13 of 15th July 1975.

Accordingly, all motor vehicles with externally supplied ignition produced as of 1 October 1976 must be provided with anti-tamper devices for the idle-mixture-adjusting screw so that it is not possible to adjust the screw without destroying the anti-tamper device. The intention is to prevent non-experts from re-adjusting the idle setting and thus inadmissibly influencing the exhaust gas. Consequently, the anti-tamper caps may only be used in the workshop and must not be sold to customers for their own use.

These anti-tamper caps come in different colors. The cap to be used for the after-sales service is red. It can be obtained from Bosch under part number

3 430 522 002.

The anti-tamper device for the air-flow sensor is removed and fitted using special tools (e.g. No. 4521/7 from the firm Hazet, D-5630 Remscheid).

After-sales Service

Technical Bulletin

Packaging of goods under warranty

438

K-Jetronic (CIS)

VDT-I-438/101 B
10. 1976

All components or assemblies of the K-Jetronic which are dispatched under warranty must be correctly and carefully packaged so that no further damage or impairments occur during transit, since these would not be covered by warranty.

Any fuel remnants must be removed from those K-Jetronic assemblies intended for dispatch, so as to eliminate any danger of fire during transit.

The intake openings and outlets of the assemblies must be sealed off with caps or plugs. As new products were fitted, the caps or plugs from these may be used.

The plunger of the fuel distributor is to be fitted with a protective cap of adequate size, or secured to the fuel distributor.

In addition, the assemblies are packed in tightly packed, well-sealed plastic sleeves. Fuel distributors and warm-up regulators are packed individually.

If components arrive damaged due to incorrect packaging or do not comply with these instructions, they can be returned and the warranty claim rejected.

BOSCH Geschäftsbereich KH, Kundendienst, Kfz-Ausrüstung.

After-sales Service

Technical Bulletin

Securing of idle-speed adjusting screws

K-Jetronic (CIS)

438

VDT-I-438/102 B
11.1976

According to a statutory regulation, changes have been made to § 47 of the German traffic licensing laws concerning exhaust gases and their outlets. This regulation was printed in full in traffic law sheet 13 of 15.7.75 .

Consequently, all motor vehicles with external-ignition engines must have their idle-speed adjusting devices secured from the 1st October 1976, so that adjustment of the screw is impossible without destroying the securing device. This should stop unskilled people from adjusting the installation of the idle-speed system and thereby illegally influencing the emission values. As from now, securing caps can only be used in the workshop and cannot be sold to customers for their own use.

Securing caps are produced in various colors. For after-sales service the following caps and colors are used:

downdraft air-flow sensor
Blue — securing cap is not available from BOSCH. Part number is DB 000.997.59 86 from the Deutsche Vergaser Gesellschaft K 34 520

updraft air-flow sensor
Red — Part number 3 430 522 002

These stipulations are only valid in countries where ECE regulations (Economic Commission for Europe) apply. The air-flow sensors must however be converted for the use of these securing caps, as a matter of principle. The caps can also be used in countries not subject to ECE regulations, to prevent dirt penetrating through the pipe to the adjustment in the case of updraft air-flow sensors.

BOSCH Geschäftsbereich KH. Kundendienst. Kfz-Ausrüstung.

After-sales Service

Technical Bulletin

EXCHANGEABLE NON-RETURN VALVES
in electric fuel pumps 0 580 254 ..

VDT-I-438/104 En
3.1983
(Replaces Ed. 5.1982)

Electric fuel pump	Parts set (non-return valve + seal ring)	Non-return valve	Seal
0 580 254 001	1 587 010 500	---	---
002	500	---	---
0 580 254 003	502	---	---
004	502	---	---
005	502	---	---
006	502	---	---
007	500	---	---
948	005	---	---
949	002	---	---
950	006	---	---
951	006	---	---
952	002	---	---
953	501	---	---
954	002	---	---
956	002	---	---
957	002	---	---
958	002	---	---
959	002	---	---
960	002	---	---
961	002	---	---
962	002	---	---
963	005	---	---

BOSCH Geschäftsbereich KH, Kundendienst, Kfz-Ausrüstung.

Electric fuel pump	Parts set (non-return valve + seal ring)	Non-return valve	Seal ring
0 580 254 964	1 587 010 002	---	---
965	002	---	---
966	002	---	---
967	002	---	---
968	002	---	---
969	002	---	---
970	002	---	---
971	002	---	---
972	002	---	---
973	002	---	---
974	002	---	---
975	003 ④	---	---
976	004 ③	---	---
977	004 ③	---	---
978	1 587 410 901	---	---
979	010 004 ③	---	---
980	002	---	---
981	002	---	---
982 ①	003 ④	---	---
982 ②	1 587 410 901	---	---
984	010 004 ③	---	---
985	---	1 583 385 006	1 580 203 002
986	---	386 011	001
987	---	008	001
988	---	008	001
989	---	008	001
990	---	385 004	002
991	---	004	002
992	1 587 010 001	---	---
996	---	386 011	001
998	---	385 004	002
9 580 234 003	002	---	---
005	002	---	---

1 = up to FD 822 2 = from FD 823

3 = Parts set ..003 also possible (delivery-line connection at 90°)

4 = Parts set ..004 also possible (delivery-line connection axial)

After-sales Service

Technical Bulletin

HOT-STARTING PROBLEMS

438

VDT-I-438/105 En
3.1980
Replaces Ed. 2.1980

K-Jetronic

Hot-starting problems can occur in various vehicles fitted with K-Jetronic. This means that when an engine is switched off whilst still hot and then switched on again after a short period, it does not start as well as it should.

The engine, the ignition system and the K-Jetronic system in these vehicles should be carefully checked. With the K-Jetronic particular attention should be paid to the:

complete system (in case of leaks),
injection valves (in case of leaks),
correct position of the air-flow sensor plate (rest position).

Instructions can be found in the vehicle-related repair manuals VDT-W-438/5.. .

If the engine still does not start satisfactorily when hot, even after checking, a timing relay can be fitted in K-Jetronic systems which are not equipped with a solenoid valve for reducing the control pressure as additional starting help.

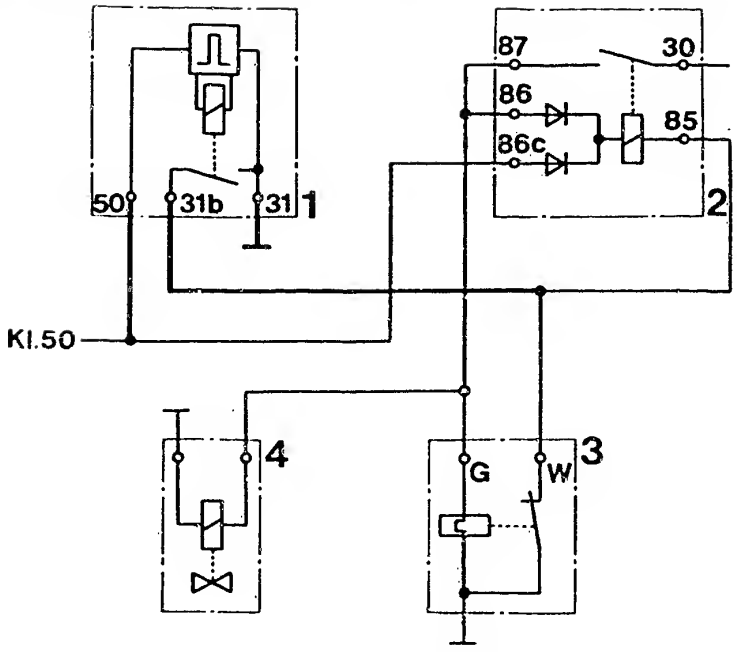
Timing relay 0 340 000 003 controls the start valve during hot starts. The start valve then injects extra fuel intermittently (sometimes cutting out completely.

The timing valve is fitted according to the wiring diagram (see reverse side). The fitting of this relay will be charged for.

After fitting the timing relay starting should be carried out as follows:

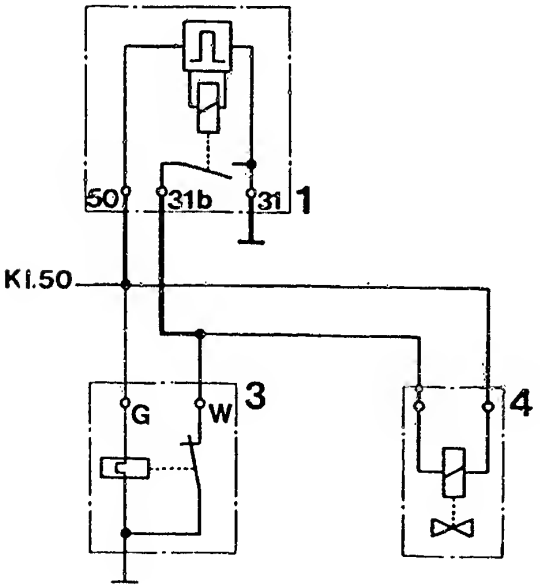
Vehicles with start valve in intake manifold - with open throttle valve,
Vehicles with start valve in idle duct - with closed throttle valve.

BOSCH Geschäftsbereich KH. Kundendienst. Kfz-Ausrüstung.



K-Jetronic system with post-injection relay

1 = Timing relay 0 340 000 003
2 = Post-injection relay
3 = Thermo-time switch
4 = Start valve



K-Jetronic system without post-injection relay

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19. Idle adjustment

19.1 Test conditions

Warm the engine up for the idle adjustment (oil temperature approx. 80°C).

Important note:

If fuel-injection tubing or injection valves were loosened or removed, the engine should be warmed up under load. The low rate of fuel flow during idling is not always adequate to drive all the air out of the fuel-injection tubing.

The idle speed must not be adjusted when the engine is too hot, e.g. immediately after being raced or after a power measurement on the roller-type test stand.

In vehicles with an air conditioner, this should be switched off to stabilize the engine speed during idle-speed adjustment.

Engine-speed measurement with separate tachometer.

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